

TECHNOLOGY DEPARTMENT

# Construction

# Methods

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## In this Issue

Ready-Mixed Concrete for  
St. Louis Sewer Job

Building West Side Sewage  
Works at Chicago

Handling Concrete Forms for  
Stacy Park Reservoir

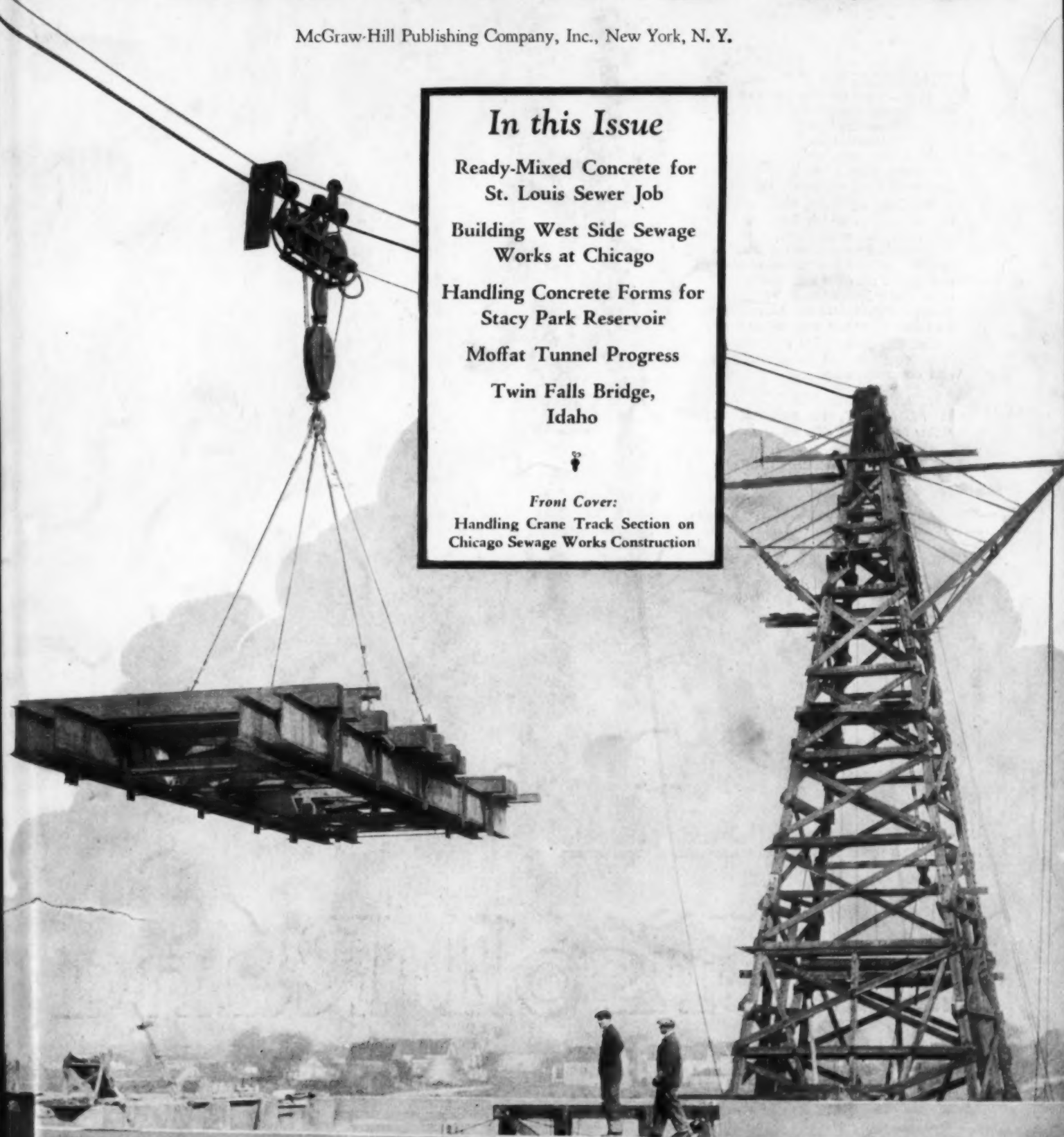
Moffat Tunnel Progress

Twin Falls Bridge,  
Idaho



### Front Cover:

Handling Crane Track Section on  
Chicago Sewage Works Construction



A MONTHLY PICTORIAL OF FIELD PRACTICE AND EQUIPMENT



## Put This Chain On Your Job

Left (top to bottom): I-R Portable Compressor, Paving Breaker, "Jack-hammer" Drill, Portable Hoist, Riveting Hammer, and Pneumatic Saw.

*The Best of Tools  
Plus High-Grade Service*

**I**NGERSOLL-RAND Portable Compressors are the key-link to a strong chain of equipment that includes Paving Breakers, Rock Drills, Portable Hoists, Pneumatic Tools, Clay Diggers, Backfill Tampers, and "Safety-First" Air Saws. Not a weak link amongst them—all tried and proven labor-savers.

Speaking of links, there's the I-R service policy, which backs up every piece of Ingersoll-Rand equipment. Well-stocked warehouses (like that illustrated below) are placed at convenient points all over the country. They carry not only adequate stocks of spare parts, but complete machines that can be taken right out and put to work.

Call the nearest I-R service station. Your requests will be given prompt and courteous attention.

**INGERSOLL-RAND COMPANY**  
11 BROADWAY, NEW YORK CITY  
Offices in principal cities all over the world

For Canada refer:  
Canadian Ingersoll-Rand Co., Ltd.,  
10 Phillips Square - Montreal, Quebec



Below: A typical I-R warehouse and service station



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# Ingersoll-Rand

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TECHNOLOGY DEPT.





# What's Doing This Month

Looking Over with the Editor

**"LET** the belt do it," is coming to be the modern contractor's slogan. More and more contractors are using belt conveyors on all kinds of jobs,—for handling all kinds of materials. In this issue we show them on five different types of construction: First on a big sewer job (p. 6) and then at the new West Side disposal plant in Chicago (p. 10). Next on the Stacy Park Reservoir in St. Louis (p. 17) and then on the big Moffat railroad tunnel in Colorado (p. 22). Last, a viaduct job in Illinois (p. 33). Variety!

Sewer, disposal plant, reservoir, tunnel and viaduct; material-handling problems solved by using belts. Maybe we'd better call this "Belt Conveyor Number."

..... **STEP-BY-STEP** pictures in proper sequence, showing details of many different field operations, proved so popular a feature of "Construction Methods" last year that they will be continued during 1928. The subjects covered in past issues include changing an excavator boom, rigging a stiff-leg derrick, erecting overhead steel bins, in-



stalling tower and chutes for concreting, setting steel road forms. In this issue, we are giving the Step-by-Step fans a double-header: "How to Lengthen a Crane Boom" and "How to Strip Road Forms." For next month we have scheduled a step-by-step pictorial series on how a gin pole rig was used effectively in setting up the mast for a guy derrick on a building job.

**MOFFAT TUNNEL** Nears Completion: With the recent completion of the work of taking out the bench and bringing the section to full width and height, the 6-mile Moffat tunnel through the Continental Divide in Colorado enters the final construction stage. The new route will shorten the rail distance between Denver and Salt Lake City by 173 miles and will eliminate 27 miles of 4 per cent grade. How Hitchcock & Tinkler, Inc., the contractors, handled some of the construction features of this outstanding project is told pictorially on pages 22-25.

**PLAYING POSITION:** Masters like Willie Hoppe or Young Jake Schaefer play billiards so that almost every shot looks absurdly simple.

The reason? They play "position,"

planning every shot to bring the balls into a cluster,—*"under the hat"* they call it—and thus pave the way for the next count.



The wise construction man, too, "plays position." That means nothing more or less than **THINKING AHEAD**—planning plant layout, selecting equipment and drawing up progress schedules so that the job operations "click."

**WHERE DO WE GO FROM HERE?** Some of our readers certainly liked our new "Job Guide" department, judging from the letters we've already received about this new feature. "I'm through on the Moffat tunnel. Where's another big tunnel job opening up," writes a hard-rock foreman from Colorado. And others in like vein.

..... **A CHANGE OF DIET** is relished by every man now and then. He gets fed up on the same "chow" day in and day out. Ask any ex-doughboy of the A.E.F. about this. There's a sameness, too, in the diet of construction machinery. Take a dragline, for instance. It feeds on earth, sand, gravel, gumbo, and assorted varieties of muck. Across the border in Canada, however, a dragline was served from a different menu. How it "ate up" a tidbit in the form of a timber flume is told on p. 3 in pictures from A. Griffin, superintendent of operation and maintenance for the Canadian Pacific Ry.

**SPARE PARTS:** The farmer who locks the stable door after the horse is stolen has a first cousin in the construction industry. He's the contractor who never orders a sup-



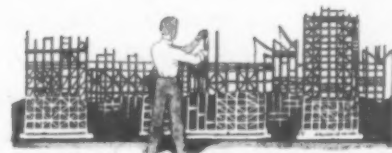
ply of spare parts until after one of his machines has gone bad, causing a costly delay in the progress of the job.

And how the manufacturer or the local equipment distributor does love to receive a rush order to ship new parts just as he is closing up shop late Saturday afternoon!

**LIKE THE COWBOY AND THE INDIAN,** the old time contractor who ruled with a pick handle is passing into history. Nowadays, with mechanical equipment revolutionizing the industry, the modern contractor has to use brain more than brawn. **MIGHT** doesn't make **RIGHT** any more in the construction business.

**"FROM THE GROUND UP."** Some contractors head big organizations with projects under way in dozens of places. Others swing a single local job and do it well. Large or small, contractors who have made good have one thing in common: **KNOWLEDGE OF THEIR BUSINESS.**

"He was, first and foremost, an expert in his profession; he knew the building business from the ground up," said an old friend of George A. Fuller, who developed the big construction company that bears his name. "He knew the **ANATOMY** of a building, how every part was put together, how it



ought to be put together. There wasn't a man that ever worked for him who would not admit that Fuller knew more about every single part of the game than he did."

*Construction Methods* is edited for the men interested in construction anatomy—how structures are put together, how methods are applied, and how modern equipment and materials are used as a substitute for the slow hand-labor methods of a construction generation that has passed.

**NEXT MONTH:** Track improvement for Denver & Rio Grande Western R.R.; Missouri highway maintenance "kinks"; the contractor goes shopping for equipment; constructing an all-steel residence; two picture-stories on dams: Horse Mesa dam (curved, concrete) in Arizona, and Guernsey dam (hydraulic fill) in Wyoming.

Also: Step-by-Step Field Methods; Job Oddities; and Close-Ups of Construction Details.

There'll be an idea or two for you in the March issue.

# Eat Your Cake and Have It Too

**T**HERE is an old saying that you cannot eat your cake and have it too, and it's true of most things. Nearly all commodities are consumed in use. Food is consumed. Clothing is consumed.

But there is a product used but not consumed. Cement is used in making concrete, and concrete is permanent. It grows stronger with age. It cannot rust, rot or burn. It endures.

Concrete highways connect city and country. Well-paved streets and alleys are built of concrete. A grid-iron of hundreds of thousands of miles of concrete sidewalks in the United States makes walking easy. Railroads are large users of concrete. Modern buildings are of reinforced concrete. Concrete goes into many farm structures. Almost everything from chicken coops to skyscrapers rests on a concrete foundation.

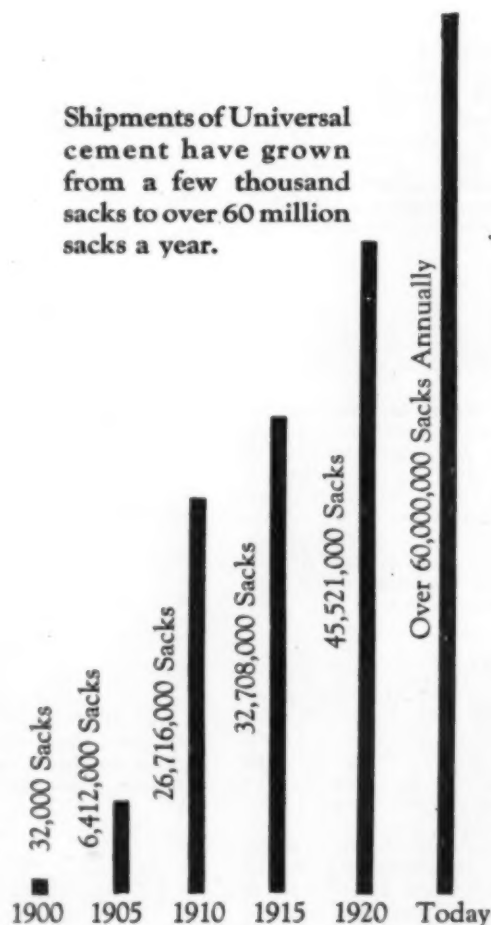
The Universal Portland Cement Co. has shipped a total of nearly a *billion* sacks or nearly 50 *million* tons of cement. This would fill about one and a quarter *million* box cars, each holding over 800 sacks, making a train over 9000 miles long and requiring over 30,000 locomotives to move it. This is enough cement to build a system of permanent concrete roads radiating from Chicago to the capital of every state in the Union.

Practically all this Universal cement—nearly a *billion* sacks—still

serves a useful purpose. It has not been consumed but has been transformed into houses, industrial buildings, improved highways, modern city streets, water-power developments and other valuable improvements that form additions to the permanent taxable wealth of the country as well as tools for production of additional wealth.

Universal cement, unlike the cake one cannot eat and also have, is used but not consumed.

Shipments of Universal cement have grown from a few thousand sacks to over 60 million sacks a year.



**Universal Portland Cement Co.**

Chicago Pittsburgh Minneapolis Duluth Cleveland Columbus New York

**Concrete for Permanence**

# Construction Methods

McGraw-Hill  
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E. J. MEHREN, Vice-President

A monthly pictorial of field practice and equipment illustrating successful construction, maintenance and material-handling methods for general construction, highways, buildings, industrial plants and public works and utilities

WILLARD CHEVALIER,  
General Manager  
ROBERT K. TOMLIN,  
Acting Editor

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NUMBER 2

**W**HEN it was found impossible to salvage profitably parts of a timber flume 2,600 ft. long in Alberta, Can., a P & H dragline was used in a novel fashion as a wrecker. The floor joists were dug off with the dragline bucket, and the floor itself, consisting of two layers of 2-in. tongued and grooved planking was ripped off with chains. Heavy

## Dragline Dismantles Wood Flume

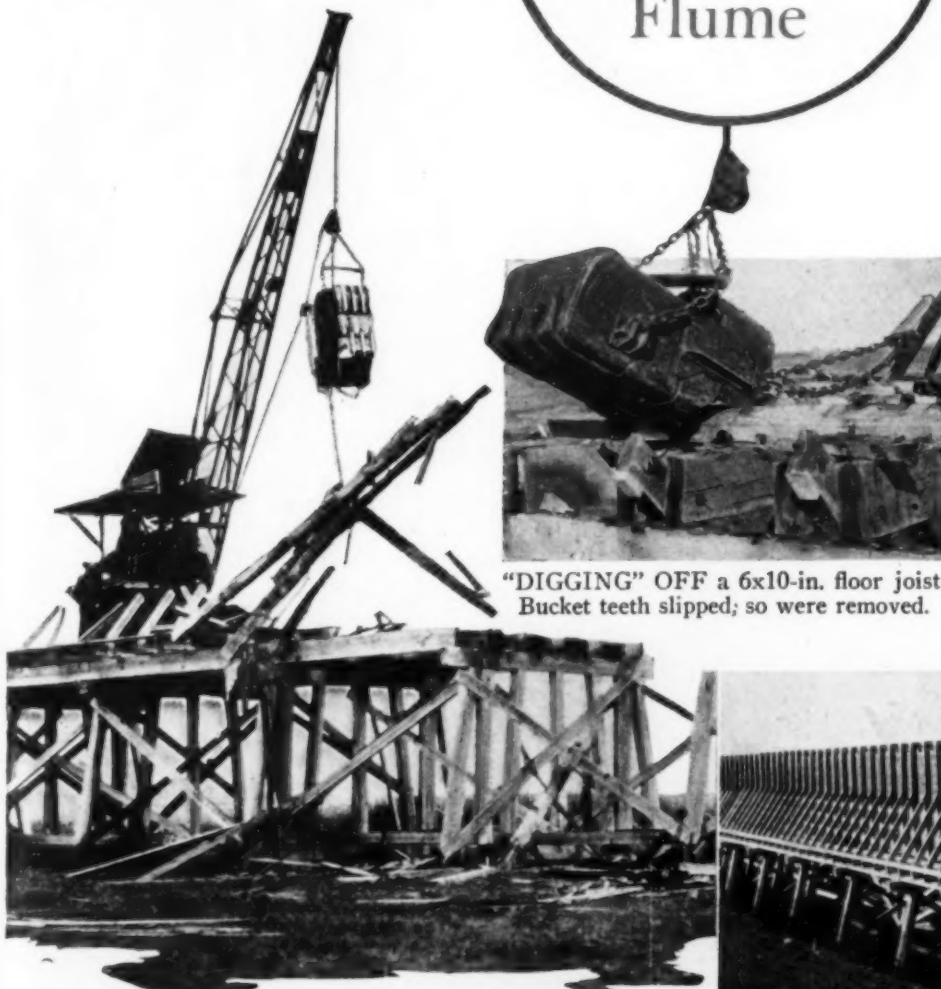
stringers were yanked out in the same manner.

The flume is near the line of the Canadian Pacific Railway. A. Griffin, superintendent of operation and maintenance for the railroad, directed the dismantling and took the accompanying photographs.

The old flume, which is to be replaced by a larger one on the same trestle bents, was 8 ft. deep and 13 ft. 6 in. wide. After the sides and bracing had been removed by hand, the dragline machine moved out on the flume floor and began the dismantling, entirely completing a 16-ft. section and then moving on.

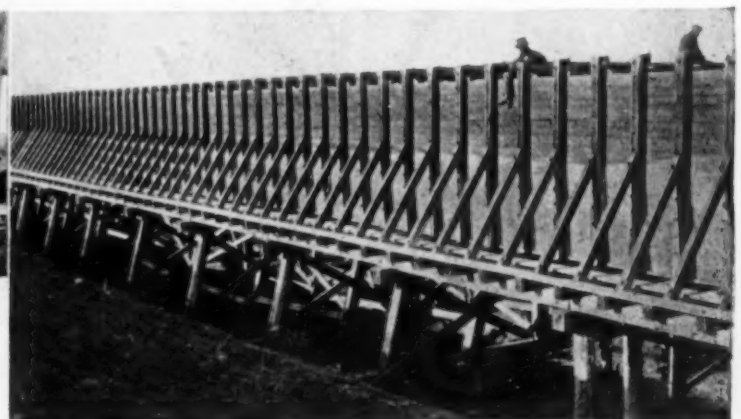
The flooring, laid longitudinally and spiked to the floor joists, was hauled up by a chain from the dragline which was passed underneath and around a full flume width. The chain rolled the flooring up in a bundle and swung it to the ground. Next the 6x10-in. floor joists were removed by the dragline bucket. The loosened joists were handled to the ground by chains.

Good progress was made by this novel method, with the dragline averaging 145 lin.ft. a day. The trestle bent was left intact as a foundation for the new flume.



"DIGGING" OFF a 6x10-in. floor joist.  
Bucket teeth slipped; so were removed.

CHAIN FROM DRAGLINE swings bundle  
of 6x10-in. joists to ground.



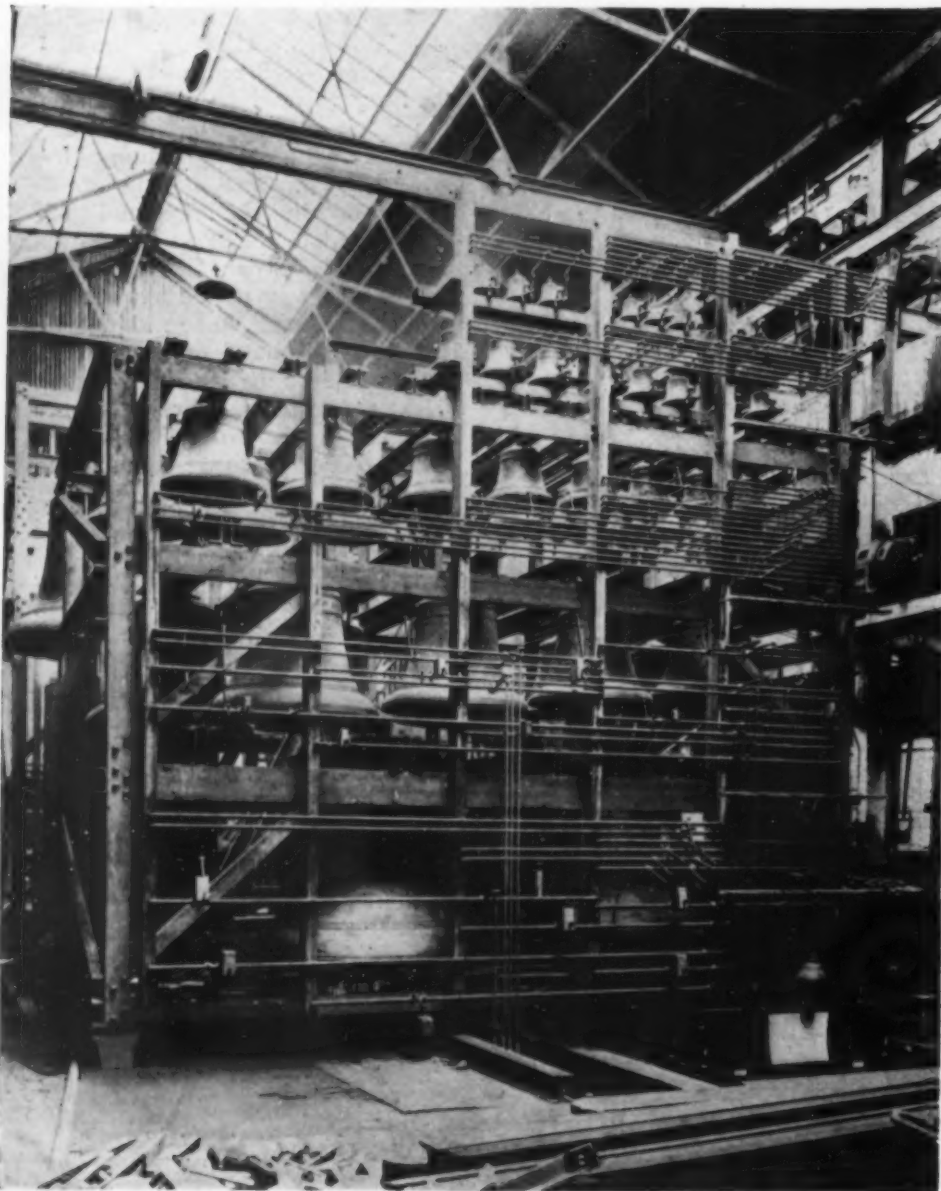
FLUME BEFORE DISMANTLING.  
Sides and braces were removed by hand.



# *This Month's*



**CARLTON BRIDGE COMPLETED.** Combined highway and railroad bridge crosses Kennebec River at Bath, Maine. Substructure put in by Foundation Company of New York, and superstructure by McClintic-Marshall Company. Lower deck carries single track for Maine Central R.R. and upper deck a 20 ft. highway.



Page 4



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**MAYOR WALKER OF NEW YORK** juggles steam shovel levers breaking ground for \$4,000,000 yards and shops of municipal subway.

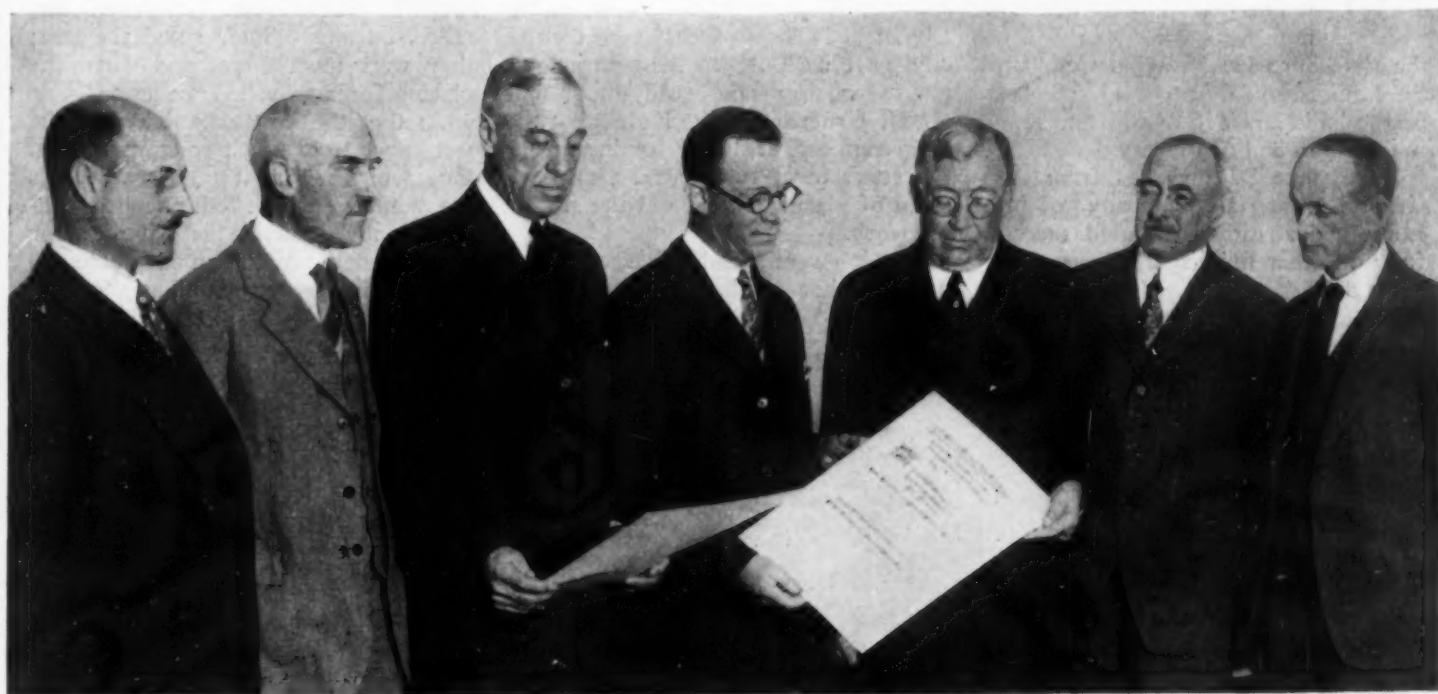
**BELLS! BELLS!** American engineering societies present modern carillon to Louvain library as memorial to American engineers killed in France. Carillon has 48 bells, weighing 12 lb. to 8 tons, with range of four octaves. Picture shows bells, steel frame, and operating levers.

# "News Reel"



**OPENING THE ROAD SHOW** at Cleveland, Jan. 9, C. M. Babcock, (center) president, American Road Builders' Association; Lion Gardiner, (left) president, Highway Industries Association; and Charles M. Upham, (right) business director, American Road Builders' Association; ready to lead the convention delegates into the Public Auditorium for the first inspection of exhibits of road-building equipment and materials by 350 manufacturers.

**TRIMMING THE TREE.** A 35-ton locomotive crane plays Santa Claus at annual Christmas party of John F. Casey Co., Pittsburgh.



©International



**THE LAST SHOT!** Powder man loads final round of dynamite for clearing Moffat Tunnel, country's greatest railroad bore. (See story on page 22.)

**TO SHOW APPRECIATION** for recognition given the engineering profession by the N. Y.-N. J. bridge and tunnel commissions in naming Holland tunnel, joint committee from engineering societies presents scroll to commissioners on December 13. Photo shows Col. Willard T. Chevalier, (center) general manager of the construction group of McGraw-Hill publications, making the presentation. Left to right are: Ole Singstad, chief engineer of the tunnel; E. R. Fish, vice-president of the American Society of Mechanical Engineers; Theodore Boettger, chairman of the New Jersey Tunnel Commission; Colonel Chevalier, of the American Society of Civil Engineers; General George R. Dyer, Chairman of the New York Tunnel Commission; F. L. Hutchinson, secretary American Institute of Electrical Engineers; and Dr. H. Foster Bain, secretary of the Institute of Mining & Metallurgical Engineers.



DIGGING THE TRENCH. This dragline with 1½-yd. bucket removed 1,000 yd. of earth a day.

# Ready-Mixed Concrete

*Used to Build St. Louis Sewer*

[[ Wet Batches Carried in Trucks from Central Mixing Plant to Forms ]]

**“W**HY not buy our concrete ready mixed?”

This was the question which came up when the executives of the Blackburn Construction Company, St. Louis, Mo., were considering how best to build 2,700 ft. of concrete sewer in the south end of the city.

Ready-mixed concrete from the General Material Company of St. Louis had already been used successfully on other municipal jobs, so after some discussion R. J. Blackburn, head

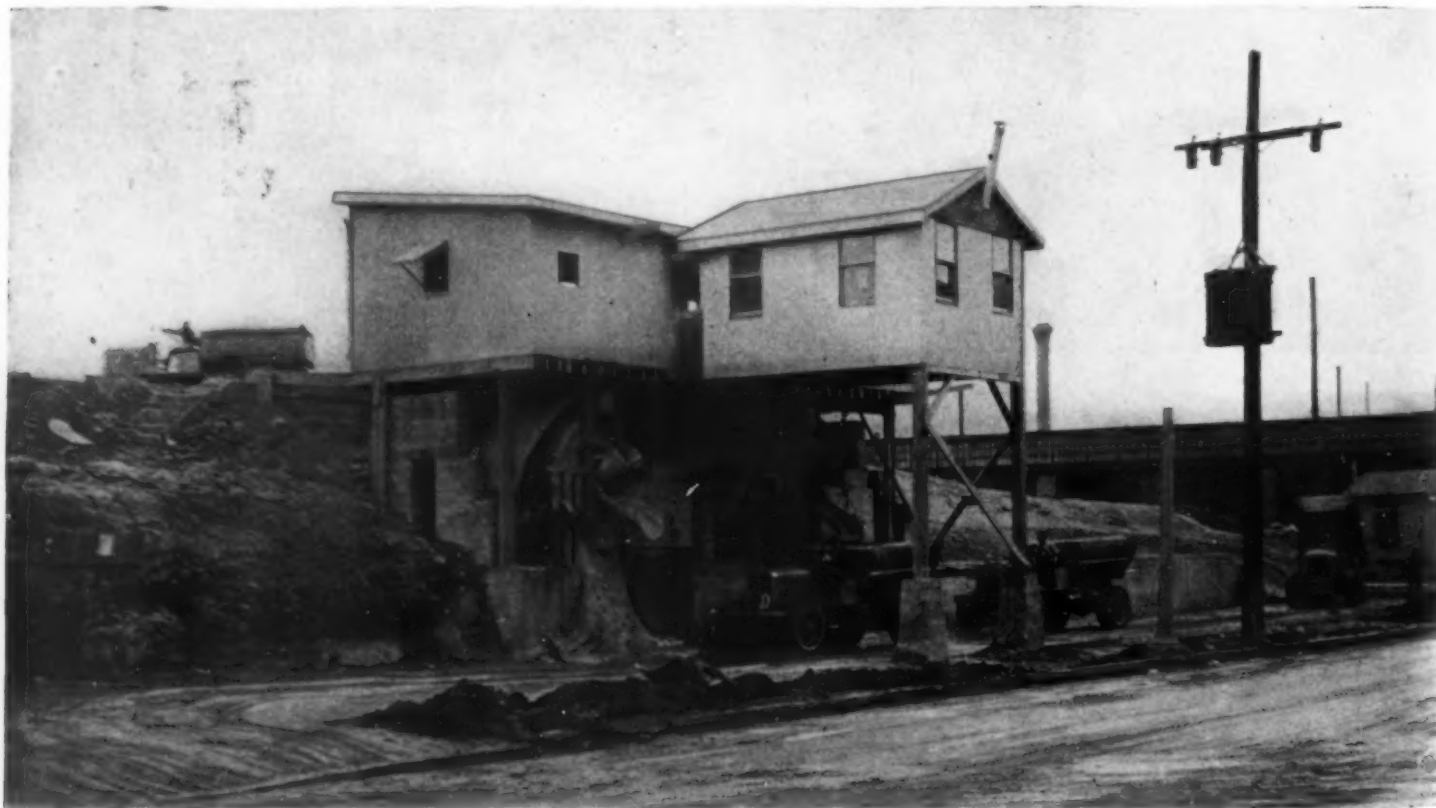
of the contracting firm, decided to try it out for the first time on sewer work.

W. W. Horner, chief engineer of the Division of Sewers and Paving for the city, gave his O.K. to the contractor's plans for using the ready-mix; and G. H. Gruetzemacher, Horner's resident engineer, arranged for inspecting the concrete at the central plant, instead of placing his men at the site of the work.

The job went ahead. The sewer was of horseshoe section in about equal

lengths of 10 ft. 6 in. and 12-ft. sizes. To keep the concrete for the big pipes moving, trucks were scheduled like railroad trains. They stood the test; they were always on hand when the placing foreman yelled “concrete.”

At the job the trucks delivered the wet concrete to a belt conveyor, 32 ft. long, which carried it to the forms. As the pouring progressed, the belt conveyor moved along the edge of the sewer trench, proving an adaptable and efficient means of handling the con-



CONCRETE FOR SALE! Here is the mixing plant where all the concrete for the sewer was mixed. Trucks take wet batches from two 2-yd. Ransome mixers.





**DELIVERING THE CONCRETE.** The trucks dump the wet mix on the end of a Link-Belt loader which carries it to forms.

crete after delivery. No difficulty was experienced with the ready-mixed concrete. It arrived in suitable condition for handling, and reached its final berth in the sewer well before initial set.

Superintendent Lewis Berry chose wood forms in 30-ft. lengths for building the sewer. He poured the inverts first; then, after the concrete had taken its initial set, moved the interior crown forms forward and placed them in position. The outside crown forms he added in sections as the walls were poured.

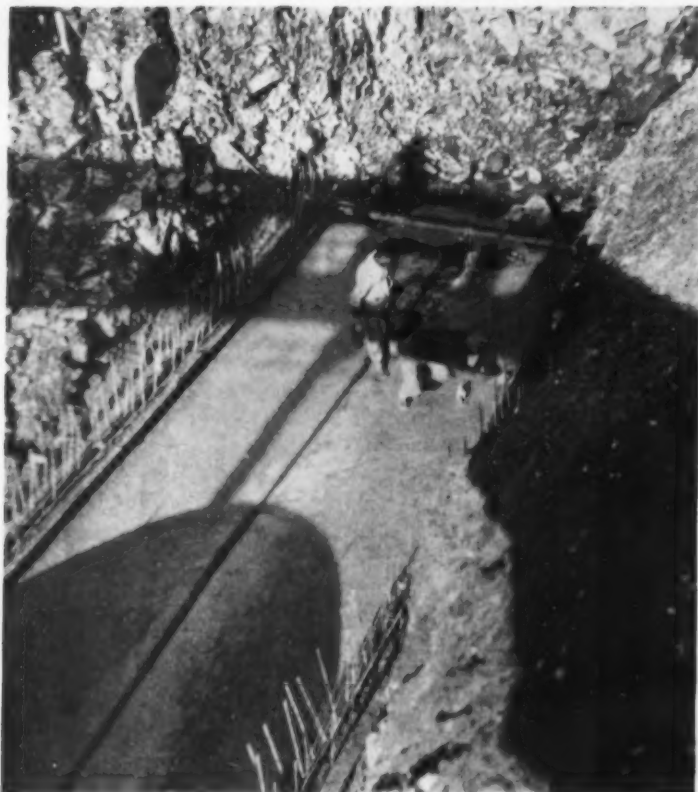
For placing in the forms, Berry used a chute



**FEEDING THE BELT.** Workmen shovel the wet mixture on the conveyor.



**PLACING THE CONCRETE.** Conveyor delivers to chute which spouts the concrete into forms.



FINISHING INVERT SECTION. Interior crown forms were set after invert had hardened.



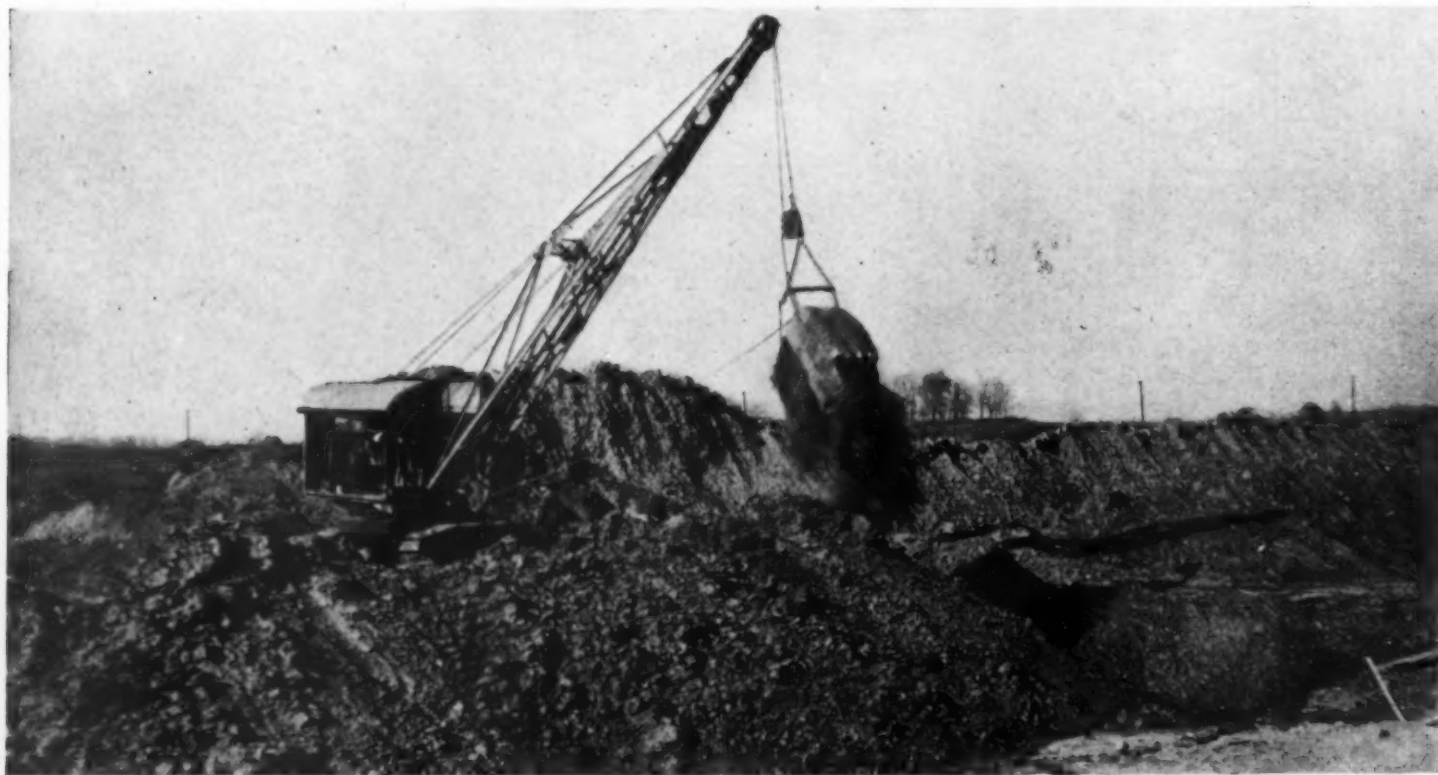
DRILLING AND EXCAVATING ROCK. Link-Belt Dragline averaged 400 yd. of rock a day.

attached to the end of the conveyor. This spouted the concrete wherever needed with only slight changes in rigging. The pouring progressed

NEXT MONTH  
**"The Contractor Goes Shopping"**

A trip through the show rooms of an up-to-date equipment distributor

smoothly until the sewer was completed, when it was backfilled, a P&H dragline with a Page bucket handling the material.



COVERING UP THE COMPLETED SEWER. Backfilling the trench with a P&H crane and Page dragline bucket.

# Gunite "Overcoats"

## *for Steel Bridge Members*

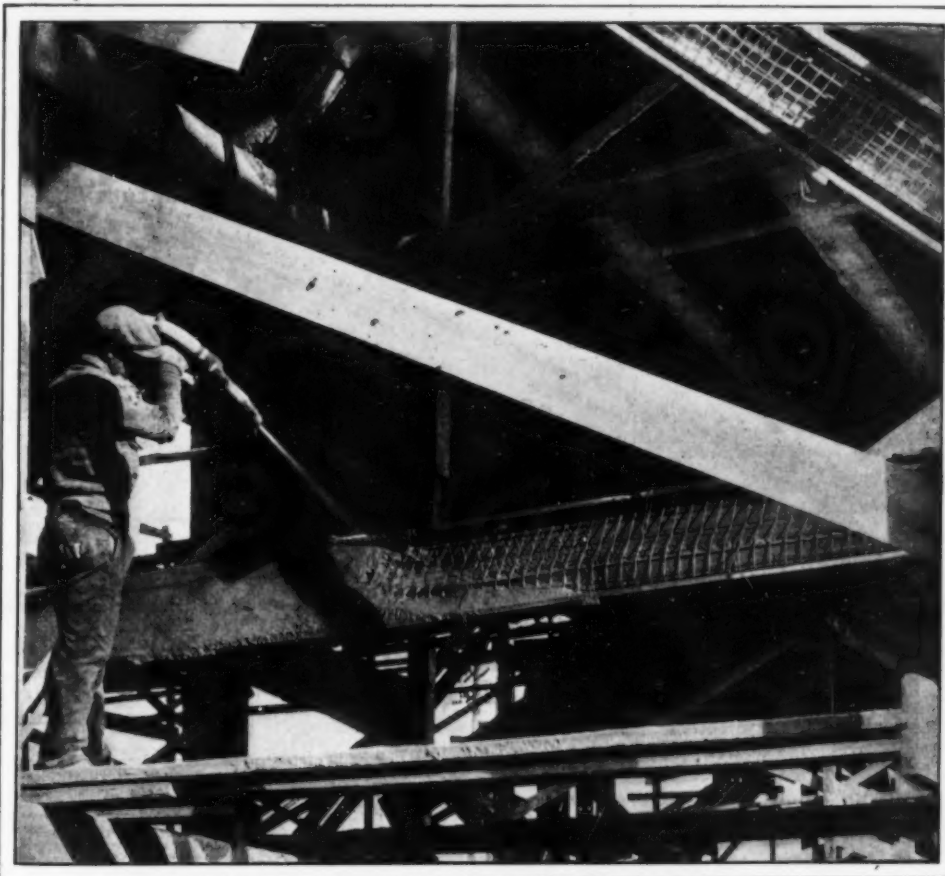
**T**O lower maintenance costs, enhance the appearance and prolong the life of steel bridges being built on the new highway approach to the Holland vehicular tunnel under the Hudson River, between Jersey City and New York, the New Jersey Highway Commission is specifying a protective coating of concrete applied pneumatically by cement guns and reinforced with welded steel wire mesh.

In coating the steel work the contractor is required to apply a 1½-in. cover to the webs of the steel members and a 2-in. cover to the bottoms of flanges. Acting as furring strips for the wire mesh, ½ and ¾-in. rods are held against the faces of the steel at 3-ft. intervals by wire ties through holes in the webs. "Shooting strips," consisting of light axles made up of two 1-in. planks, insure proper alignment and thickness of the covering at flange edges.

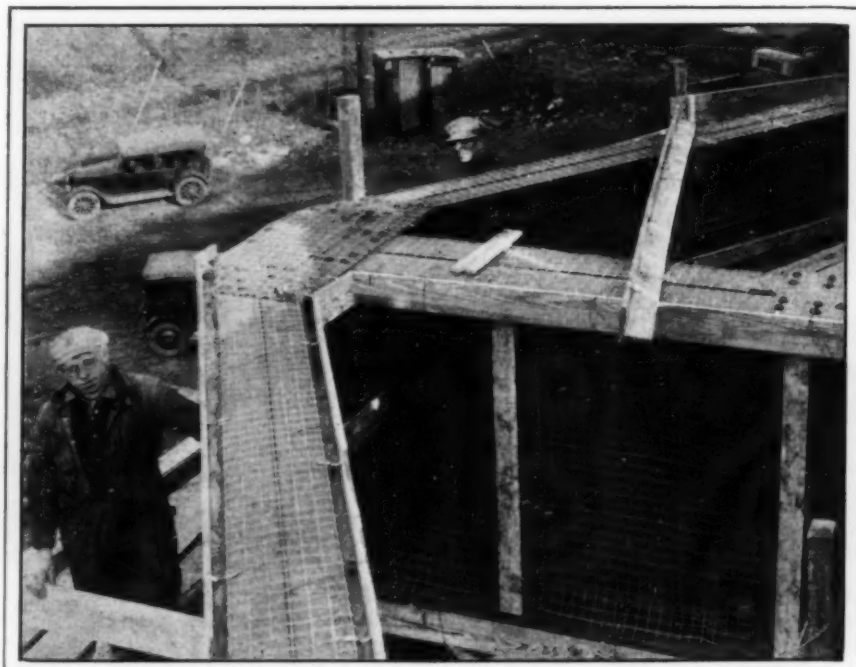
In applying the protective coating to the steel the Cement Gun Company, Inc., of Allentown, Pa., emphasizes the importance of shooting the mixture at right angles to the surface of the steel-work.

### READY FOR COATING.

Welded wire mesh attached to steel rod furring strips held in place at 3-ft. intervals by wire ties through holes in webs of steel members. One of the wooden angle shooting strips shown on top of girder.



SHOOTING the first or body coat of gunite after the wire mesh reinforcement is in place.



**LOWER MAINTENANCE COSTS** and better appearance are claimed for structural steel thus protected with gunite coating.



# Belt Conveyors Handle Materials

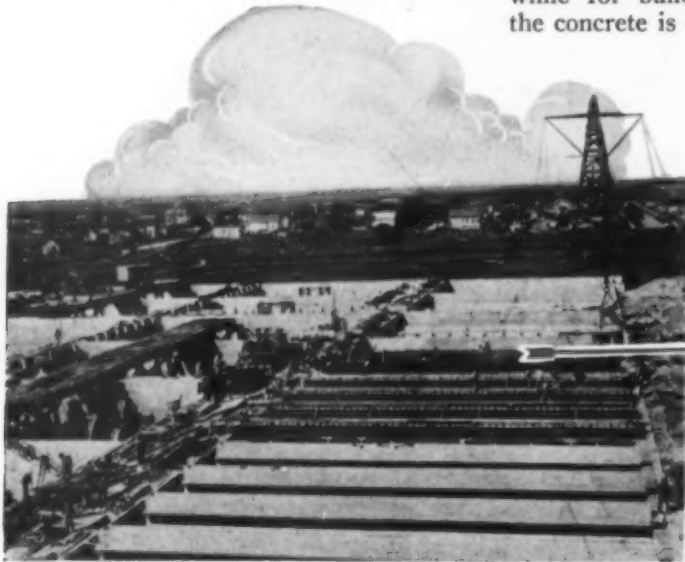
**"T**HOROUGHLY belt-conveyORIZED"—that's the best description of the up-to-the-minute construction plant used for building the West Side sewage treatment works in Chicago. Belt conveyors—both portable and fixed underground and inclined—are the backbone of the system for handling dry materials and wet concrete on the sewage disposal plant the T. H.

Forschner Company is building for the Sanitary District of Chicago.

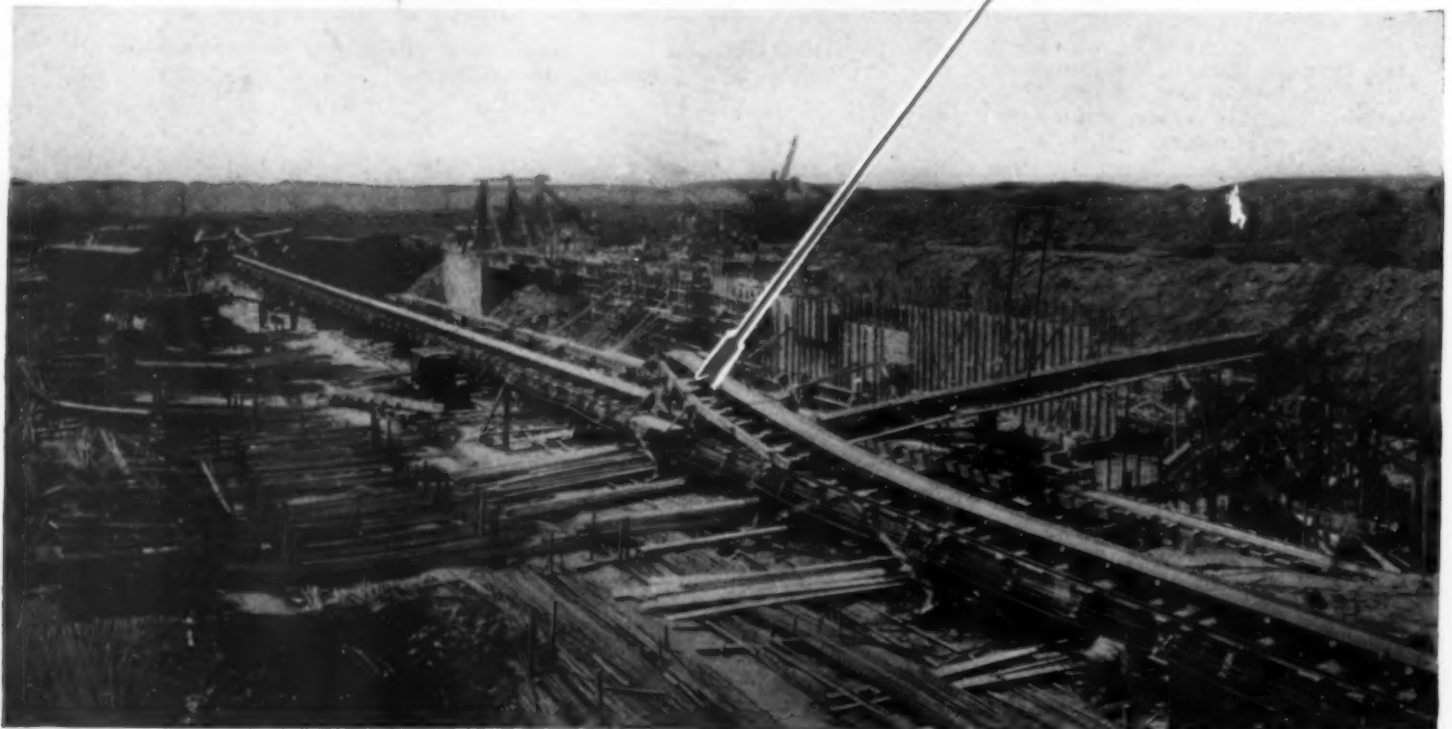
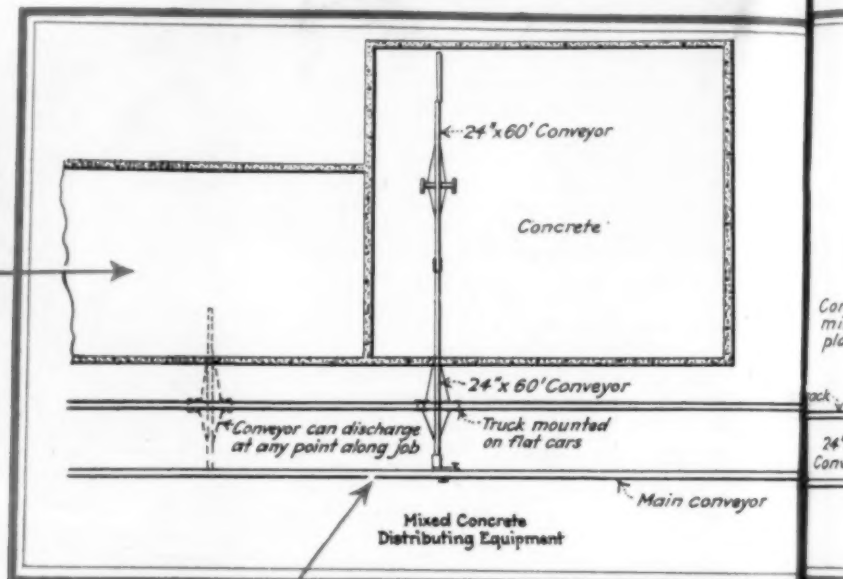
The job calls for 150,000 cu.yd. of concrete, to be placed in (1) a pumping station and 108 Imhoff tanks, 80 ft. square and 33 ft. deep; and (2) a group of units comprising skimming tanks, grit chambers, screens and sludge-drying beds. For concreting the last group, the belt conveyor system shown in the diagram below is used; while for building the Imhoff tanks the concrete is carried in 7 cu.yd. bot-

tom dump buckets on flat cars to a 760-ft. Lidgerwood cableway, which distributes it to the forms.

As shown in the plant layout diagram, the mixing plant is located between the stock piles and the concreting area served by the belt conveyors. One belt system feeds material; another distributes it. Beginning where railroad cars deliver sand and gravel to track hoppers, two Barber-Greene portable belt conveyors, mounted on special wheeled trucks for lateral



GENERAL VIEW of concreting, showing forms and walls in various stages of progress.



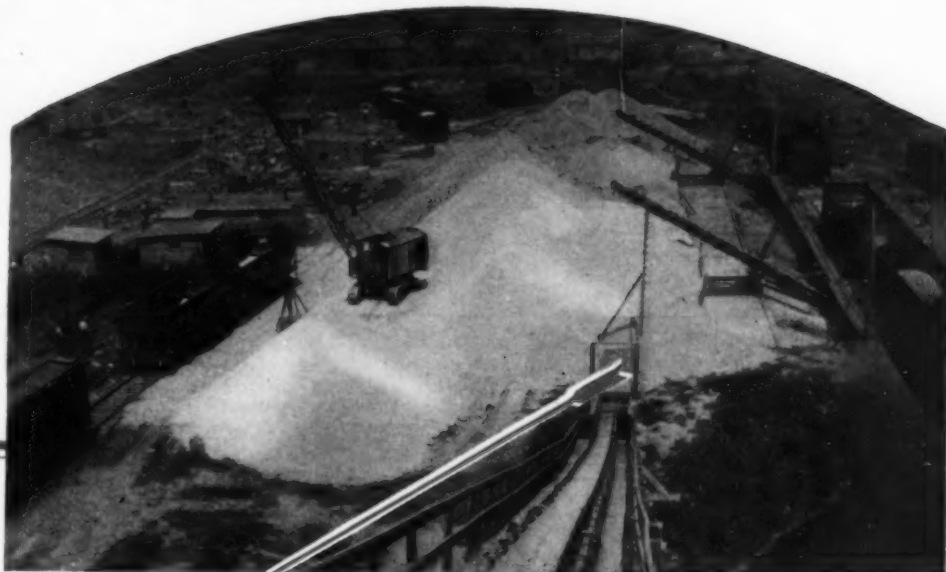
THE MAIN ARTERY of the concrete distributing system. This long stationary Link Belt conveyor runs from the mixing plant down the whole length of the concrete forms. It discharges through a tripper at any point along the line, into Barber-Greene portable conveyors placed laterally, and used either tandem or singly, as needed to reach forms.

# for Chicago Sewage Works

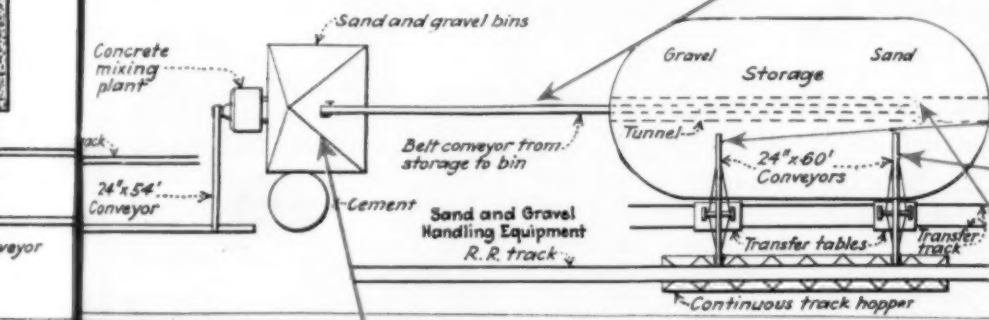
movement, transfer the aggregates to stock piles. These conveyors will unload 40 cars daily.

From the stock piles a stationary Link Belt conveyor carries the sand and gravel, first through a tunnel under the stock pile, and then up an incline to the top of the 80-ft. mixing tower.

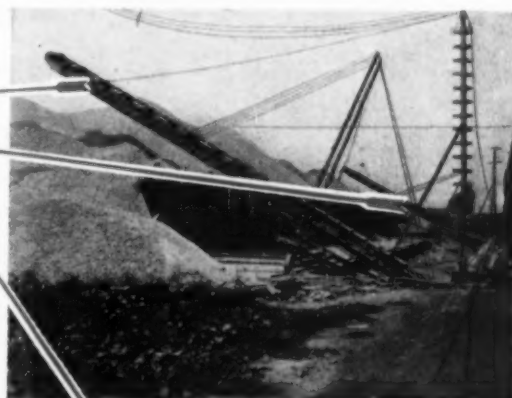
From the mixing plant a 24 in. x 54 ft. Barber-Greene conveyor feeds a stationary Link Belt conveyor 500 ft. long, which runs down the entire length of the concreting area, feeding into



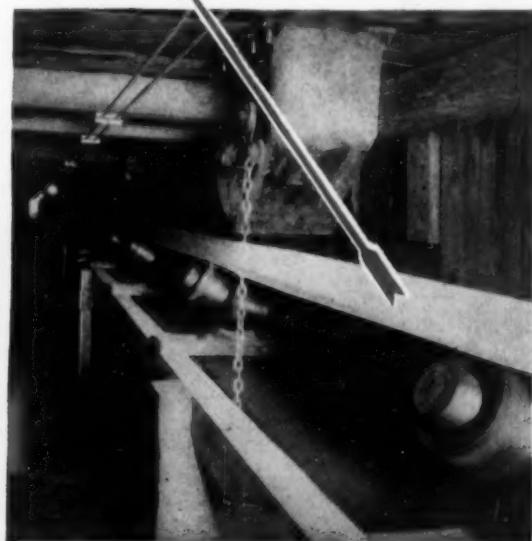
**DIAGRAM OF PLANT LAYOUT**



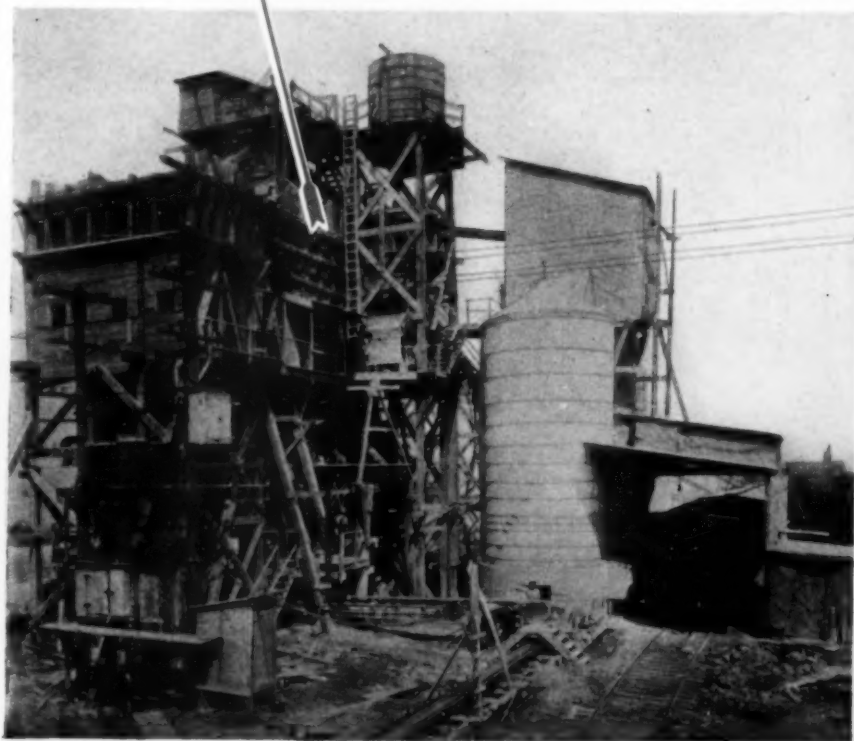
**INCLINED BELT CONVEYOR**, coming out of underground tunnel, raises sand and gravel to material bins on 80-ft. tower.



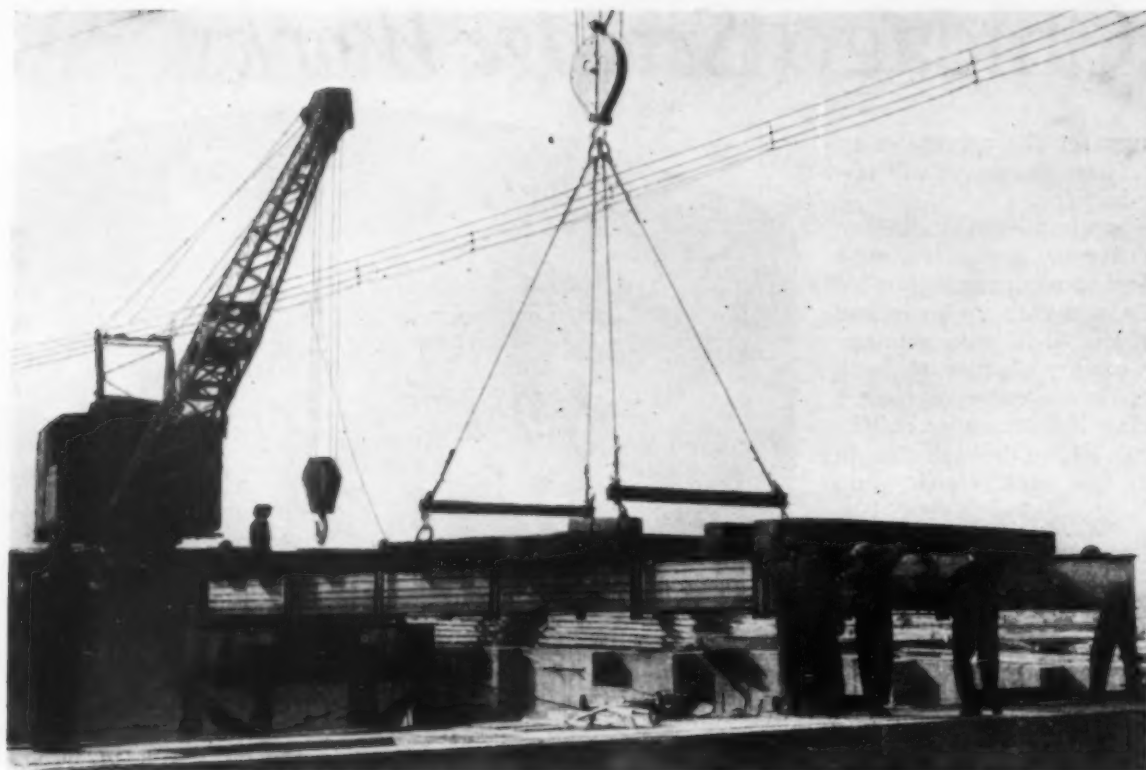
**UNLOADING MATERIAL.** Two Barber-Greene portable conveyors, with boots under track hoppers, carry sand and gravel from cars to stock pile.



**UNDERGROUND TUNNEL**, with 24-in. Link-Belt conveyor, which runs entire length of sand and gravel stock piles.



**THE MIXING PLANT**, showing cement silo, sand and stone storage bins, and concrete mixing tower. The plant is located between two belt conveying systems, one feeding sand and gravel, the other distributing wet concrete.



**1**—IN SHIFTING CRANE TRACKS, cableway picks up one section at a time and moves it to new position. Then—

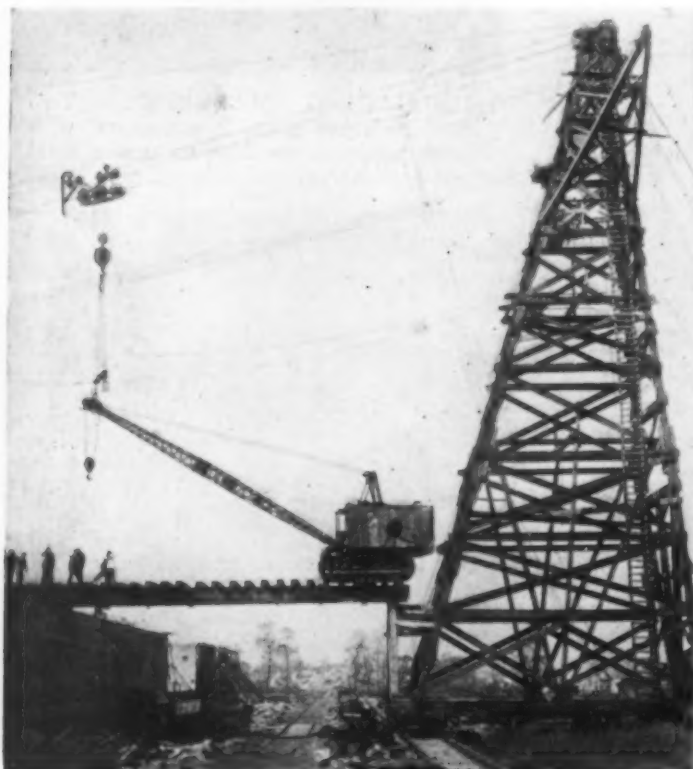
shorter Barber-Greene portable conveyors, at right angles, which place the concrete.

In building the interior of the Imhoff tanks two Northwest crawler locomotive cranes, traveling on tracks laid on the tank walls, proved most effective for handling reinforcement and form-

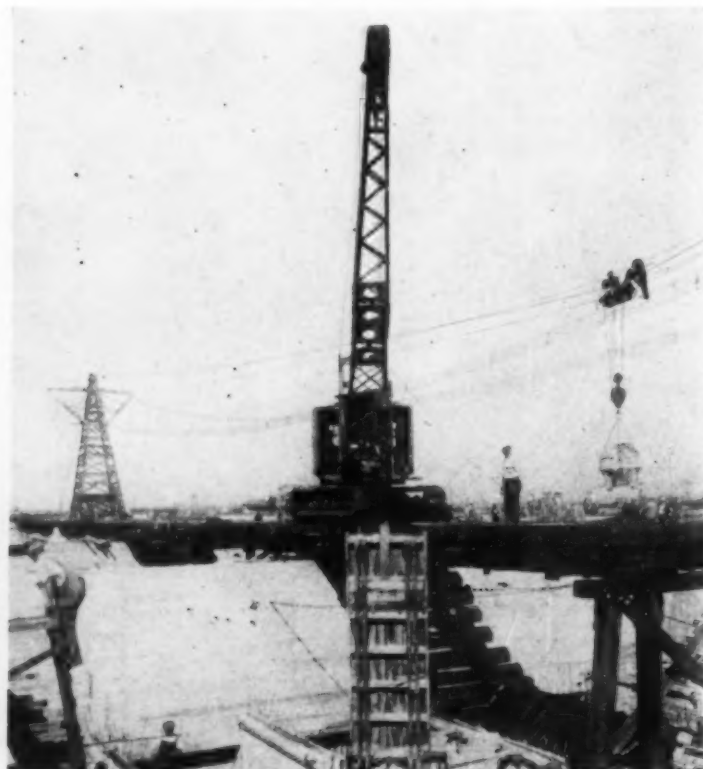
**ROAD BUILDERS!**  
Watch Next Month For  
"Maintenance Kinks  
in Missouri"

A Picture Story of Successful  
Methods and Equipment Developed  
on State Highway Work

work, and for various other uses. They crawled along on their own treads, on tracks consisting of ties laid across steel I-beams. The Lidgerwood cableway laid these tracks in sections, and also moved them as the concreting progressed, as shown in pictures on this page.



**2**—CRANE MOVES OUT on to new track across section placed between cableway tower and tank wall, and—



**3**—CARRIES ON, handling heavy forms with 45-ft. boom reaching all parts of tank. Crane runs on own treads, across ties laid on I-beams.





NOT CONEY ISLAND—but County Antrim, Ireland. Gobbins Bridge, of novel steel hoop design, bridges a gap.



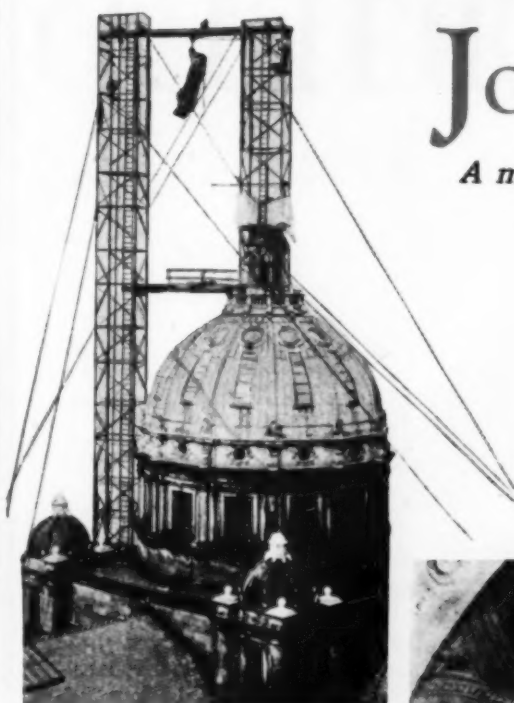
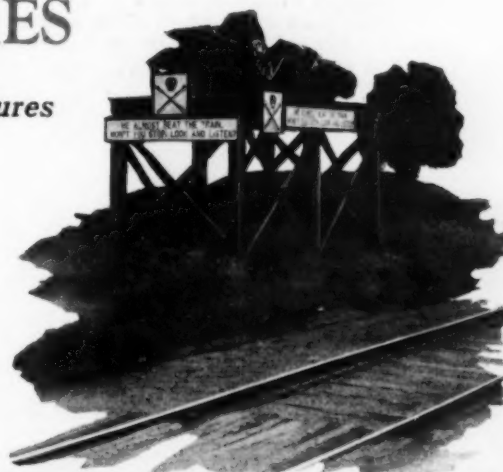
WRONG AGAIN! They're not boulders, but sand bags on wire mat used as revetment to stem Mississippi flood.

# JOB ODDITIES

*A monthly page of unusual features on construction work*

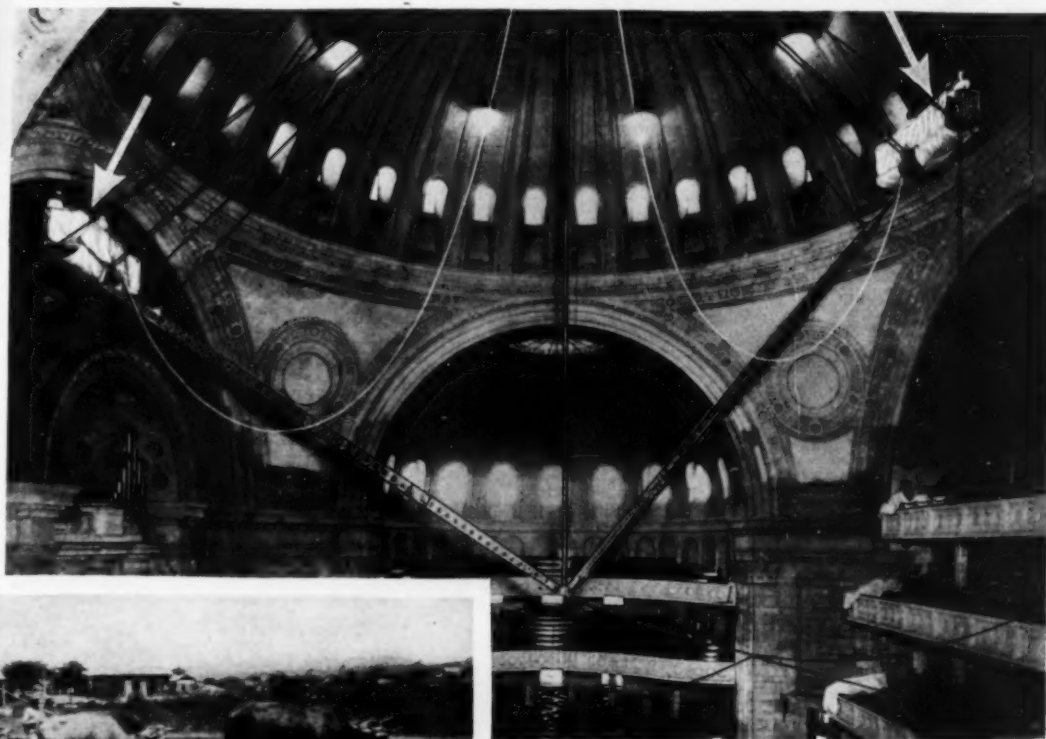
Nearly every job has its queer kinks. Hasn't yours got some? If so, send the pictures to us. We'll pay for all used.

WRECKED AUTO serves as grim warning at B. & O. grade crossing in Illinois. Photo from W. L. Glover of the state highway department.

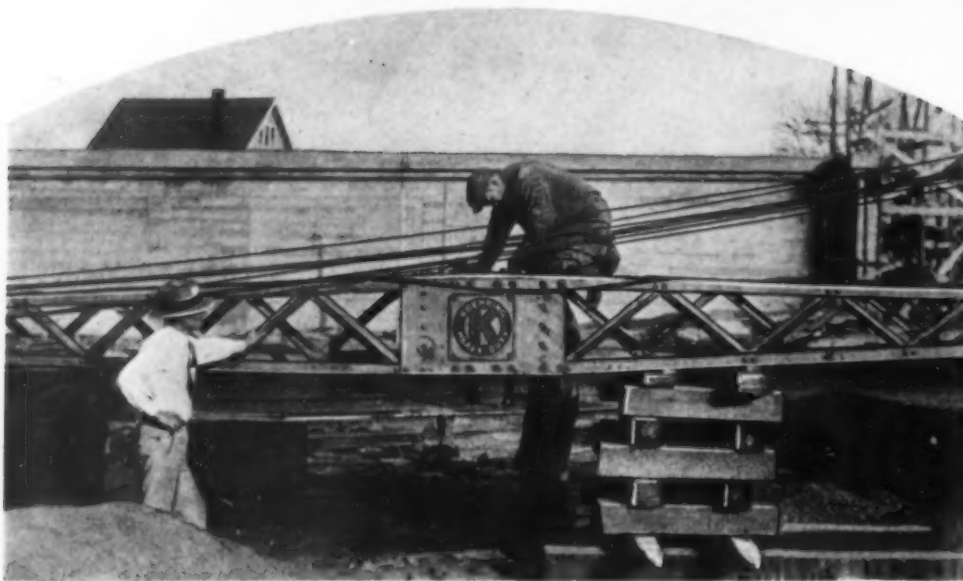


STATUE OF GEORGE WASHINGTON (at extreme top) being hoisted to place on flagpole above Court House, Washington, Pa. Photo from John Eichleay, Jr., Co., contractor. Special tower was set up to raise 6,000-lb. statue 175 ft.

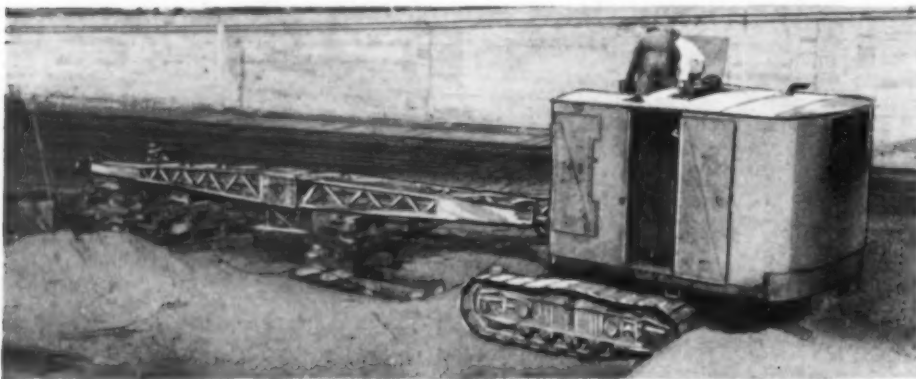
OX CART — NEW MODEL (below) Bullocks haul crawler-mounted wagon in moving earth for Cuban highway.



TWIN DERRICKS HUNG FROM DOME aid redecorating Boston church. Telescoping booms hold working platforms, shown by arrows.



- 1** ON THE DELMAR VIADUCT, ST. LOUIS, the Dunham Construction Company wished to lengthen the boom on its Koehring crane from 35 to 40 ft. The superintendent, F. R. Prendergast, first blocked the boom up on three cribs, two under the head end and one under the heel end. The bolts at the center joint were removed.

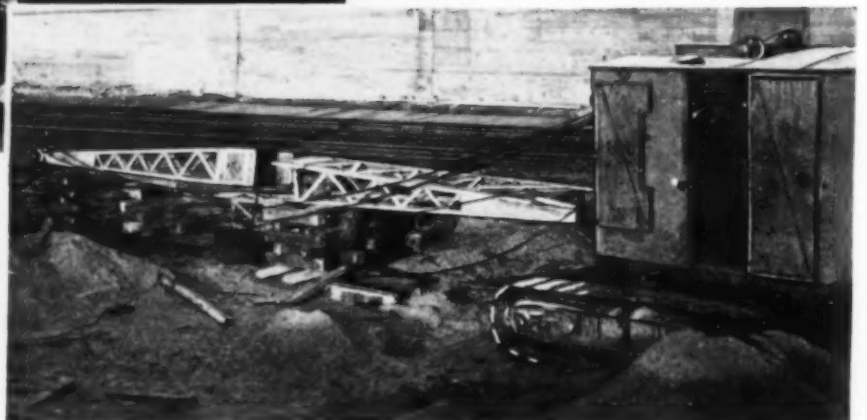


- 2** THE CABLES are pulled out to the end, giving as much loose cable as possible. They are not disconnected at the drums.



- 3** THE BUCKET-CLOSING LINE is pulled through its sheave and tied to the head end of the heel section of the boom.

- 4** *Right*—THE CRANE BACKS AWAY, pulling the heel section of the boom out of the splice plates at the joint.



# Step- by- Step FIELD

## Putting an Crane

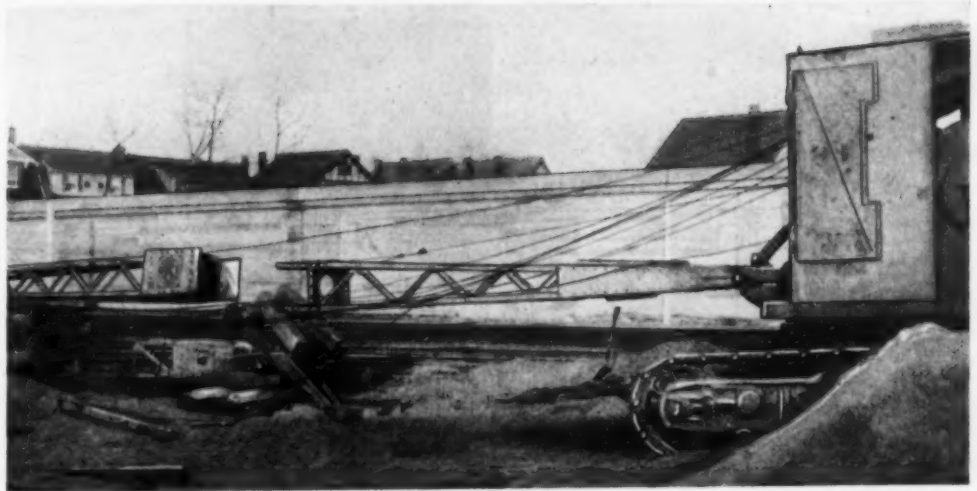
### A Double Header This Month

We have a double header for the step-by-step fans this month. Besides the picture story showing lengthening of a crane boom on these two pages, we have a series on "Stripping Road Forms" immediately following. This concludes the series on "Setting Road Forms" run last month, thus giving the complete story of a basic operation in concrete highway construction.

## Next Month

One of the most important preliminaries on nearly all jobs is setting up a derrick. Superintendents and riggers all have their pet ways of handling these details. One derrick operation—a stiff-leg—was pictured in detail in the May, 1927, issue.

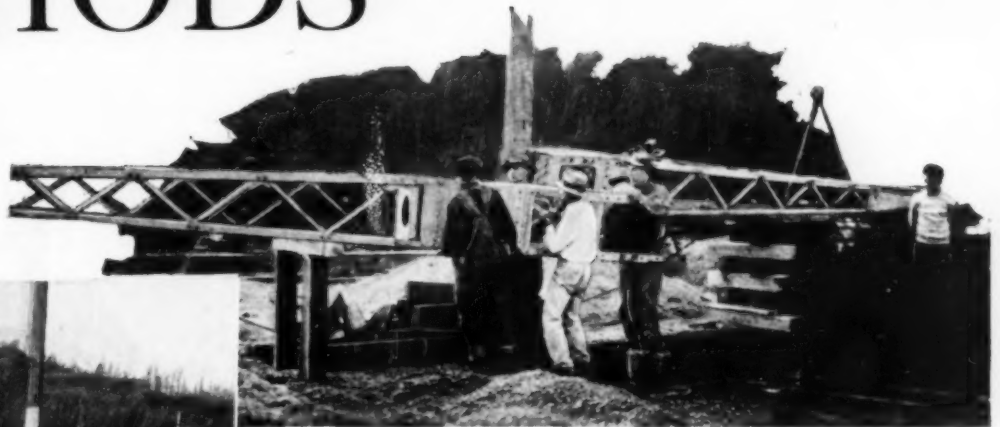
*Next Month* this department will show, step-by-step, full details of setting up a guy derrick on a building job.



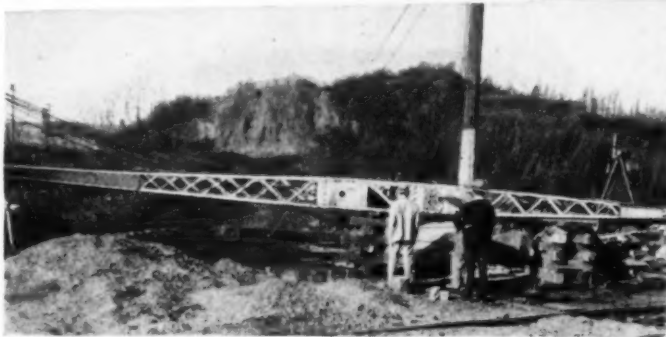
**5** THE BUCKET-CLOSING LINE holds the heel section.

# METHODS

## Extension in a Boom



**6** THE BOOM IS SWUNG a little to one side and the 5-ft. extension is lifted into place by four men and held until the first bolts are inserted.



**7** WITH THE EXTENSION bolted in place, the boom is swung back, and the crane, moving forward slowly, starts the extension into the joint plates.



**8** BY TIGHTENING UP on the boom lift falls, the two sections are forced together.

**9** Left—WITH THE JOINT BOLTED and bucket lines connected, the crane is again ready to go to work.





**1** WHEN READY TO STRIP Blaw-Knox steel forms, workman drives lock joint plate back to disconnect the form.



**2** HE DRIVES IT clear back across the joint, releasing the joint connection and freeing form except for stakes.



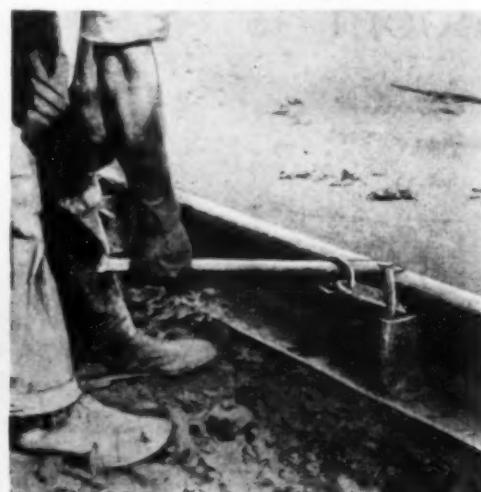
**3** THEN HE HAMMERS the steel plate keys back, disengaging the form from stakes holding it in position.

## Step-by-Step Field Methods

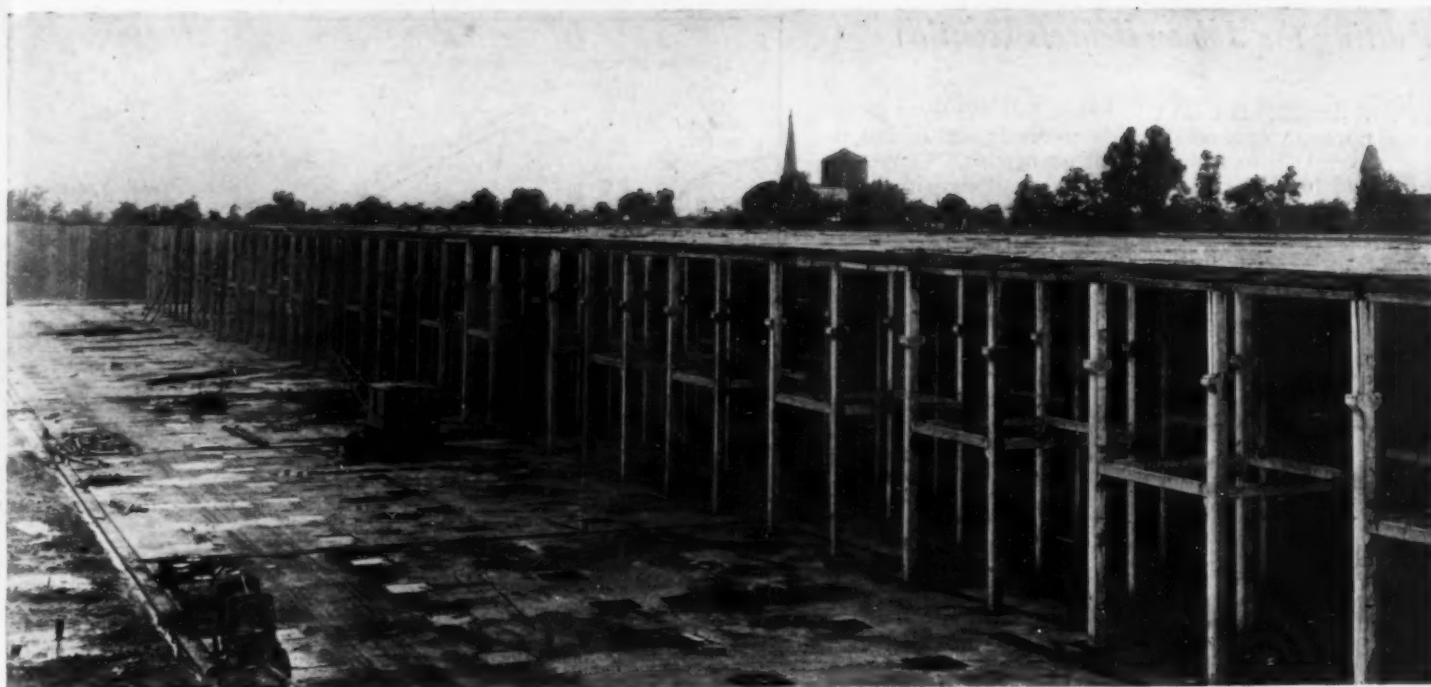
### How to Strip Road Forms

*Concluding last month's series "Setting Road Forms."*

**4** NEXT HE DRAWS the stakes out with this ingenious stake puller, after the keys are released.



**5** WITH STAKES REMOVED, the forms are easily pulled away from the pavement. Then they are carried ahead to be set up again.



A WAREHOUSE for drinking water. It's 800 ft. long, 600 ft. wide, and 34 ft. deep. Half the roof has been concreted.

# Putting the Job on Wheels

Rolling Equipment Speeds Reservoir  
Construction in St. Louis



TRUCK PLATFORM aids concret-  
ing reservoir roof.

**I**N building the Stacy Park Reservoir at St. Louis, Mo., now being completed after two years' work, the Frazier-Davis Construction Company, of that city, used mobile equipment to such an extent it might almost be said they "put the job on roller skates." Portable belt conveyors poured the foundations and made the backfill; rolling gantrys set the reinforcing steel and placed sectional forms; the concreting tower moved on wheels; and several rolling devices speeded the roof concreting and form shifting.

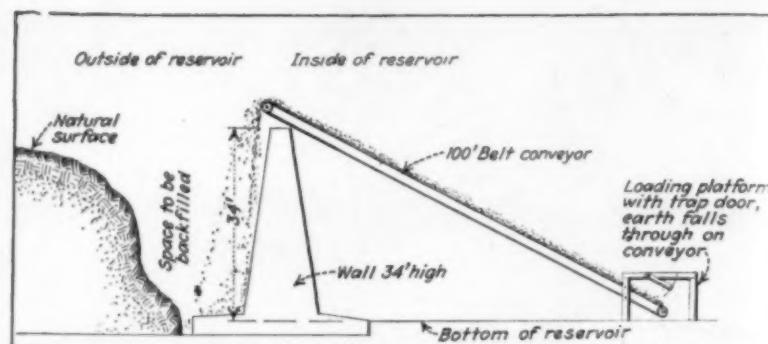
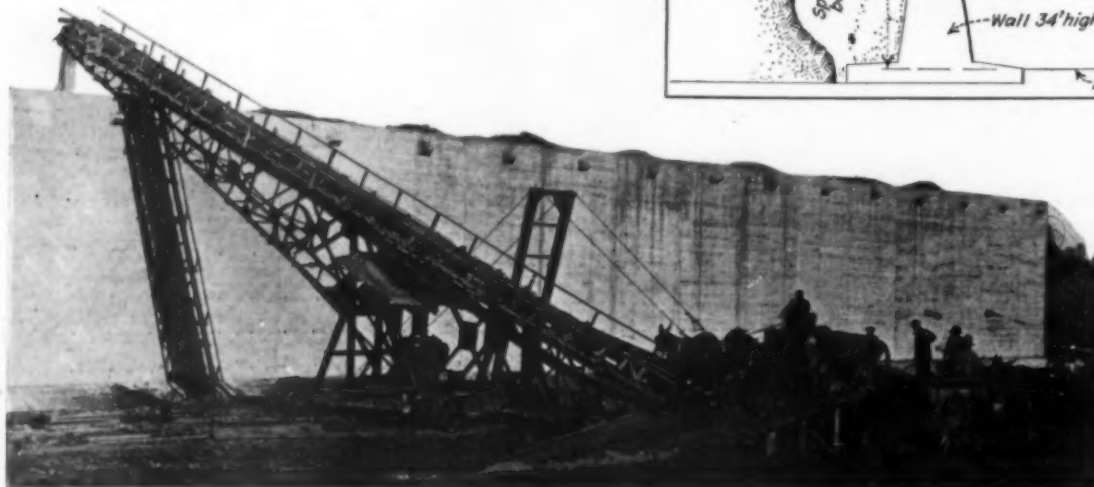
The reservoir is a great enclosed storage basin of reinforced concrete. The walls are of counterfort type, backfilled on the buttressed side. The floor is a 6-in. slab with waterproofed joints, and the roof a 4-in. continuous slab. The interior columns of the reservoir were braced with struts, and carried brackets 8 ft. from the top, on



ROLLING ALONG! Belt conveyor mounted on wheeled carriage pours foundations. Trucks dump wet concrete through ramp platform at upper right.

## Putting the Job on Wheels (cont'd)

A DOUBLE PLAY! 100-ft. belt conveyor picks up earth excavated inside reservoir and dumps it over wall to make backfill on outside. Conveyor and loading ramp move along wall on wide-tired wheels as backfilling progresses. Line sketch at right shows details.



DON'T MISS  
THE  
PRIZE PHOTOS

Pages  
28 and 29

which the contractor placed movable equipment for concreting the roof.

The wall foundations were poured with a 20-in. belt conveyor, shown in one of the pictures. Trucks hauled wet concrete from the mixer to an unloading platform above the end of the belt conveyor. Both conveyor and platform rolled along the walls.

After trying flat bottom trucks for carrying the concrete, R. F. Wieder-

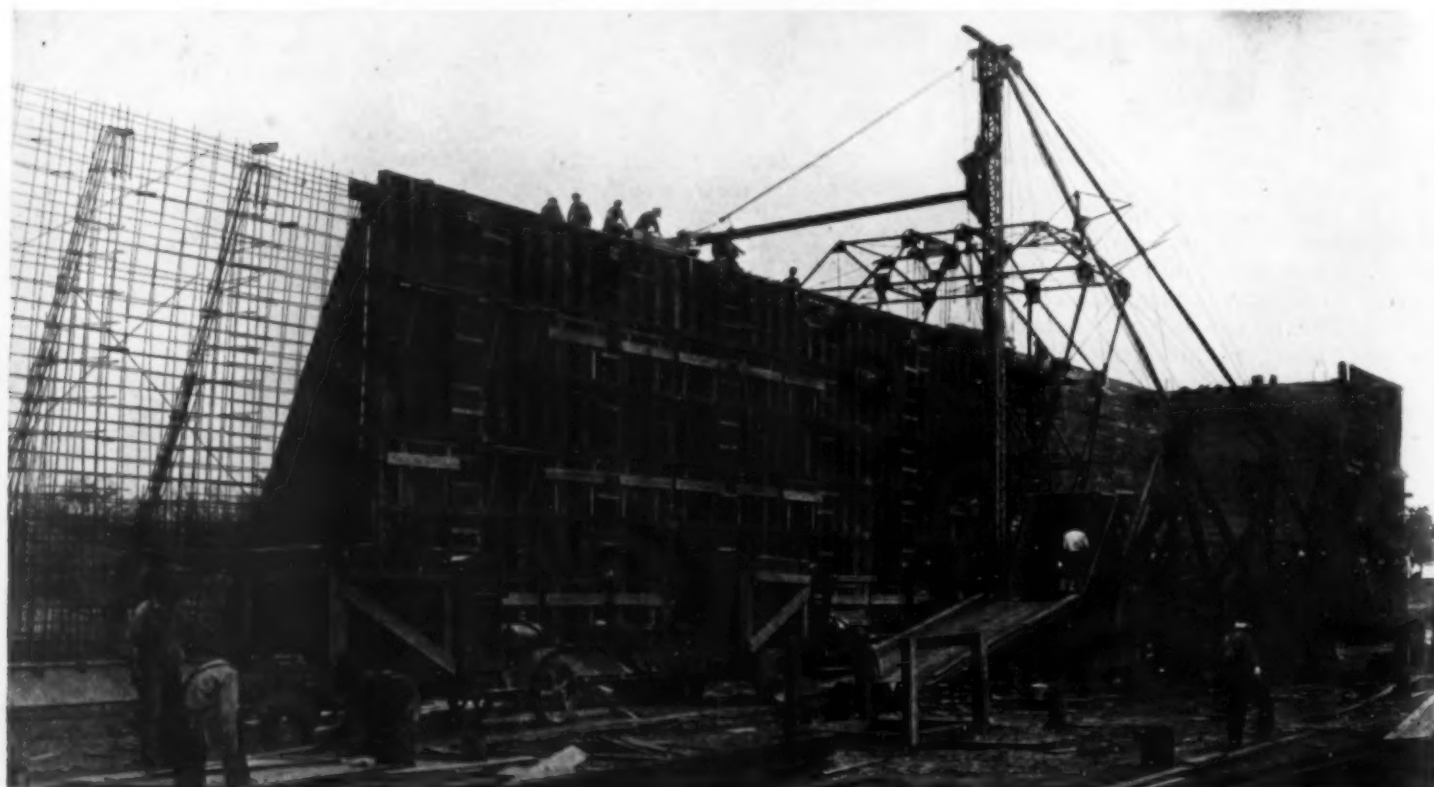
holdt, the superintendent, changed to the special form of truck body shown in the picture below. This proved more satisfactory.

Construction of the reservoir involved excavation of 207,000 cu.yd. of earth. Part of this was left inside the walls and used for backfilling, as shown in pictures at the top of this page, using a General conveyor.

A traveling wood gantry set the re-

inforcing steel, and a portable steel gantry placed the Blaw-Knox sectional wall forms. Mobile devices used for shifting roof forms are shown on the opposite page.

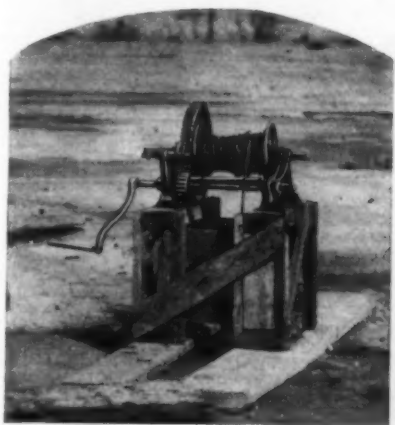
For the city of St. Louis, J. C. Pritchard, director of public utilities, and L. A. Day, water commissioner, supervised the design and construction of the reservoir. George D. Reichert was their resident engineer in the field.



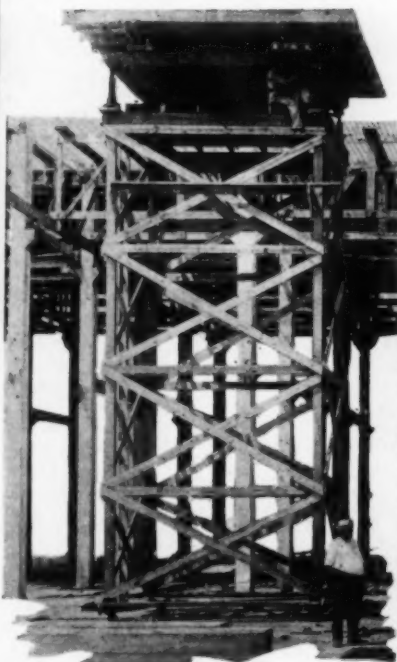
SIDE BY SIDE they traveled along! Mounted on rails, steel gantry set sectional forms and tower hoist poured concrete. Note specially built 1½-yd. truck bodies.



## Wheeled Towers Shift Movable Forms

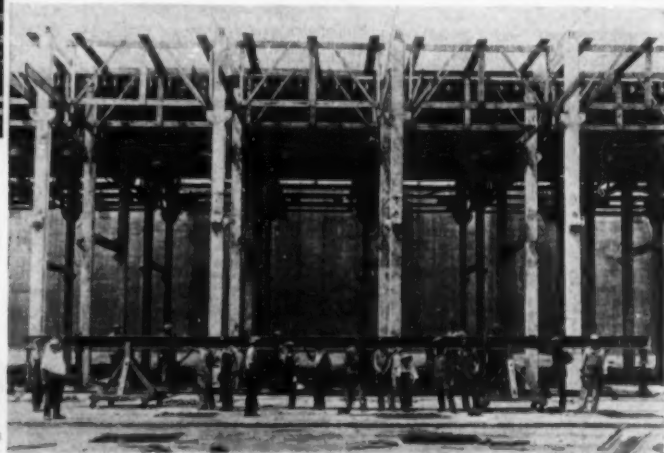


**2** HAND WINCHES support roof forms of last section (underneath) by cables run through cored holes in reservoir roof.



**3** ROLLING TOWERS with jacks at top take slab forms from the hand winches. These, relieved of form weight, lower runners to ground. (Runners have been laid aside on brackets during form removal.)

**1** Half the reservoir roof was concreted with one set-up of Blaw-Knox sectional steel forms. These rolled down the length of the reservoir on longitudinal runners set on dollies in the column brackets. Jacks on the runners supported the forms, as shown at left. When the end of the strip was reached the movable equipment had to be shifted over to the other side to concrete the second half of the roof. This series of pictures shows the shift.



**4** RUNNER DROPS on wheeled carriages, and men trundle it across floor to new position.



*Do you like photos  
showing just how  
it's done?*

THEN TURN TO  
"Getting Down  
to Details"

pages 30 and 31

*Two full pages of  
job "close-ups"*

**5** STARTING THE SECOND HALF. Crane raising runner to brackets. At right—slab forms in place, jacked up on runners, ready to start again their long roll down the reservoir.

# BYERS

## The Skimmer for Shallow Grading

ON street and road work, wherever shallow grading is done by the most advanced methods, there the Bear Cat Skimmer is in evidence.

The ideal tool for this job, the Bear Cat combines speed with economy. The long, horizontal stroke of the skimmer takes a full bucket on a shallow cut and leaves a smooth even grade, ready for the forms to be placed.

The Bear Cat is easily converted into ditcher, crane, shovel or backfiller. Furnished in either half or full revolving types. Send for new booklets.

THE BYERS MACHINE CO.

RAVENNA, OHIO

*The* BEARCAT



# Massillon

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GIVE us just three words to describe the "Master" Gas Shovel, and there's the story. This powerful machine—the biggest powered of any gas shovel of like capacity—is built to do work which no gas shovels have been thought capable of doing before.

And it is fast, faster even than steam powered machines. Its simplicity of design and flexibility of control put it way out in front of the whole field of power shovels.

Under Byers' ownership, with Byers' great distributing and servicing organization behind it, this Master Gas Shovel is the foremost value now offered in the field of 1 yard and 1 1/4 yard shovels.

THE BYERS MACHINE CO.  
Ravenna, Ohio

*The* MASTER  
1 Yd. Gas



THE BYERS MACHINE COMPANY  
Ravenna, Ohio

You may send your new Booklet describing

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WHERE THE TRAINS DIVE IN—East portal of tunnel during construction

# Pioneer Bore and Lewis Girder *Speed Driving of* **MOFFAT TUNNEL**

## *The Project*

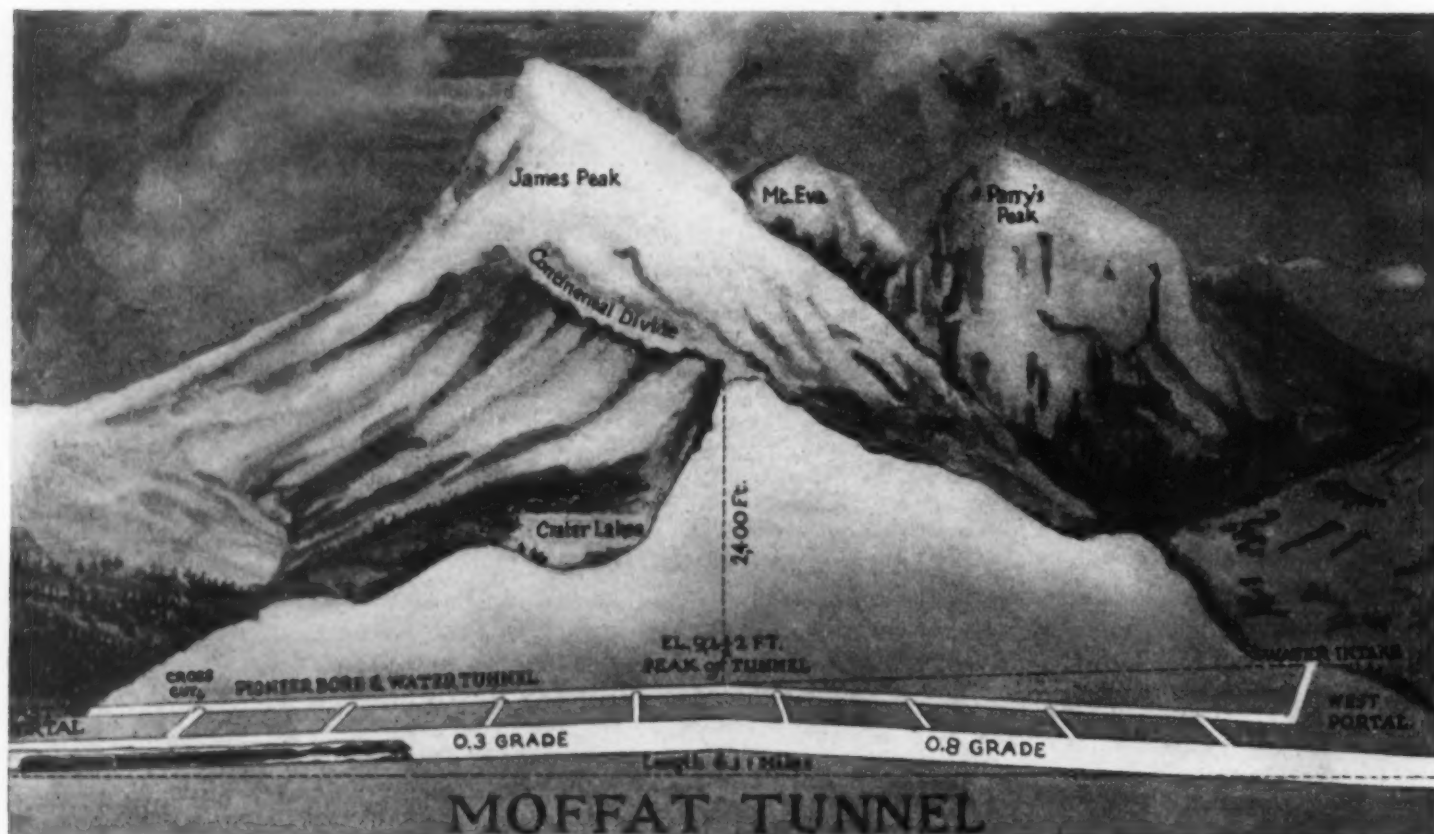
**M**ORE than 20 years ago, David H. Moffat, president of the Denver & Salt Lake Railroad, dreamed of a tunnel under the Rocky Mountains which would eliminate snake-like curves and heavy grades on his line and open the mining and farming regions of Colorado to the Far

West. He is dead now, but his dream has come true, for trains are ready to start through the Continental Divide via the Moffat Tunnel.

It was built by driving a pioneer tunnel 9 ft. x 9 ft., parallel to the heading for the main railroad bore and 75 ft. south of it, as shown in the diagram. Crosscuts between this tunnel and the main bore enabled shifts to alternate, thus carrying both forward

at the same time. This practice, together with the use of the Lewis girder to combat rock cave-ins, was the outstanding construction feature of the tunnel, and greatly increased the speed of operation.

Hitchcock & Tinkler, San Francisco contractors, began work in September, 1923. The bench was cleared Dec. 10, 1927, and lining the tunnel with concrete has just been finished.



THE TUNNEL is 50 miles west of Denver and three miles south of James Peak, 13,260 ft. high. It eliminates heavy grades and dangerous curves on the Denver & Salt Lake Railroad. It is 24 ft. high and 16 ft. wide, and is 6.1 miles long, the longest railroad tunnel yet completed

on the American continent. It has grades of 0.8 and 0.3 per cent from the west portal to an apex near the center; and 0.3 per cent for the remainder. The tunnel eliminates 30 miles of 4 per cent grade, leaving the maximum grade on the road 2 per cent. It cost over \$13,000,000.

# New Methods and Machinery Win Battle Under Rocky Mountains

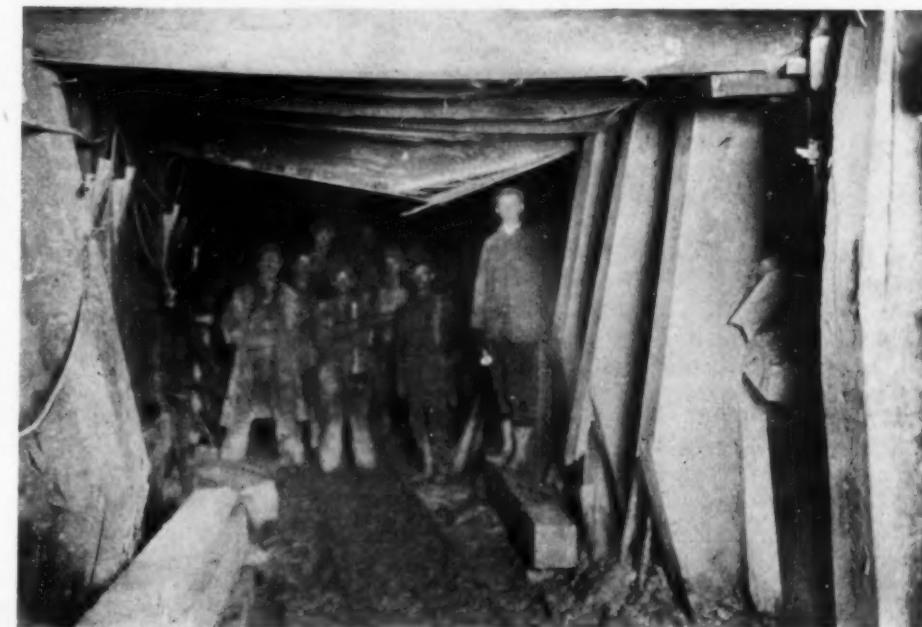
## The Methods

THE "hard rock" men who built the Moffat tunnel have written tunneling history. Faced with caving rock and underground rivers, as well as the usual difficulties of tunnel driving, they scrapped old methods and developed new schemes and new machines which won success.

Says C. A. Betts, office engineer for the Moffat tunnel, "The use of the twin heading method of driving, by alternating crews between the pioneer tunnel and the main heading, was a new departure in methods of attack and resulted in a month's record of 1,583 ft. in hard ground."

In this method the drilling and mucking crews alternate between the two tunnels, the drilling crew working in one heading while the mucking crew is in the other. The crews exchange places after a section is blasted out, crossing over through the parallel crosscuts, driven every 1,500 ft. between the twin bores.

At the east end the rock was hard, but on the west section the drillers encountered 2 miles of soft rock. Timber sheathing failed, as the oozing rock splintered even 14 x 24-in. timbers. Here "horse sense bobbed up and pulled the Moffat job out of the muck," as "Brick" Allen, chief inspector, explains it. George Lewis,



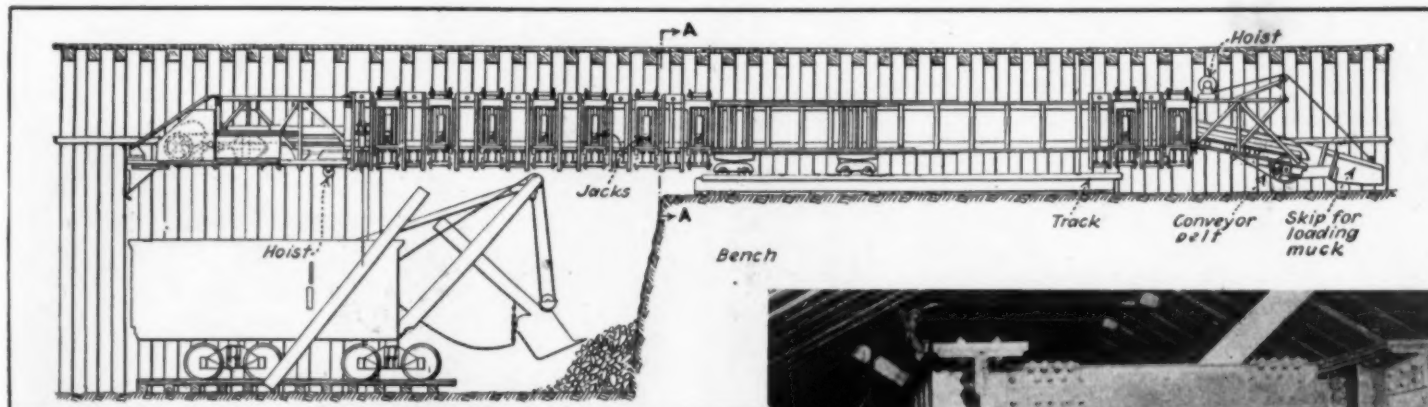
HOW TIMBERS SPLINTERED AND BOWED under tremendous loads of "flowing" rock which threatened to crush the tunnel like a paper tube. These are 12-in. by 18-in. Oregon fir.

manager and chief engineer of the Tunnel Commission, invented the traveling cantilever girder which bears his name.

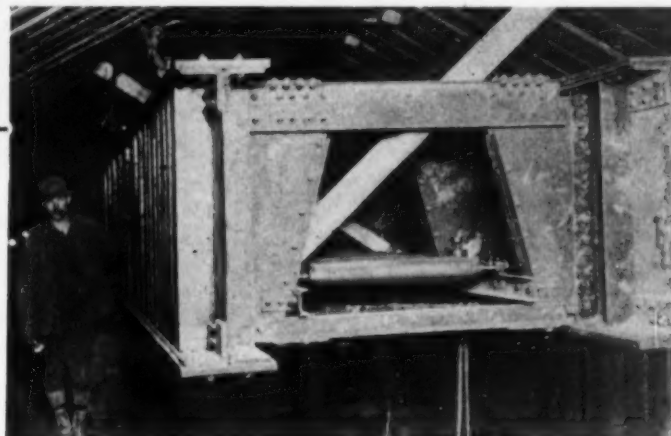
"It consists," quoting Mr. Betts again, "of two girders to support the wall plates and hold up the roof timbers while the bench is being excavated and posts set. This makes it possible to progress rapidly with com-

parative safety through very difficult ground."

An ingenious method of switching cars in the narrow tunnel to get empty cars under the muck delivery spout was also invented. This was a heavy bar placed horizontally above the two lines of cars, with an air hoist to shunt the empties into place as the filled cars moved out.



THE LEWIS TRAVELING CANTILEVER GIRDER, showing how it supports tunnel roof while shovel cuts away the bench. Belt conveyor inside girder carries muck back from bucket shown at right. Insert is end view of girder inside tunnel, showing rollers for belt conveyor.





# The Moffat

## The Machines

**S**PURRED by the difficulties encountered on the Moffat tunnel, the contractors, equipment manufacturers, and engineers developed many new machines and labor-saving devices.

Of these the Lewis girder is outstanding. It consists of two parallel 42-in. girders 60 ft. long and spaced 6 ft. apart. A reversible belt conveyor runs between the girders, which are held together by bracing. Two pairs of dollies carry the Lewis girder on a 15-in. I-beam track laid on 12x12-in. stringers on top of the bench. The forward end of the girder is blocked against the roof timbers by powerful

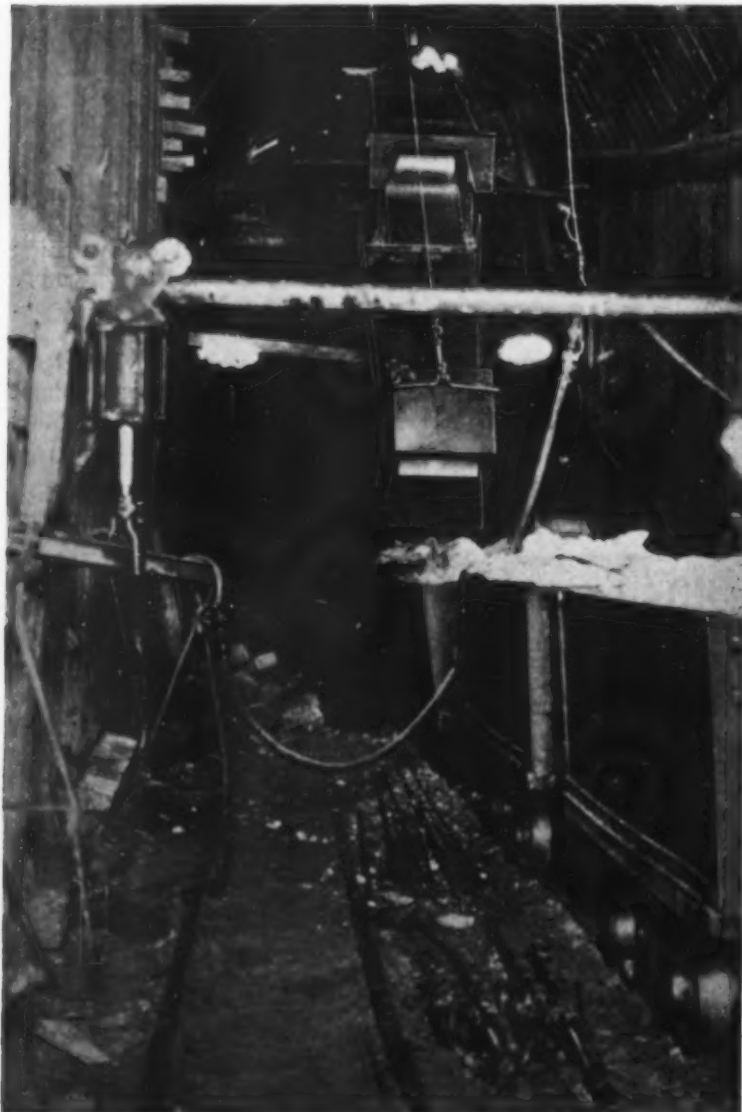
jacks and I-beams. The rear end is blocked against the wall plates with arms which prevent it from moving horizontally, but permit it being raised vertically by jacks so that the girder carries the whole load of the roof timbers and wall plates. The bench under the girder is then drilled and shot.

While the bench is being excavated under the rear end of the girder, the muck from the top heading is loaded on the forward end of the belt conveyor and carried to the rear, where it is chuted into cars.

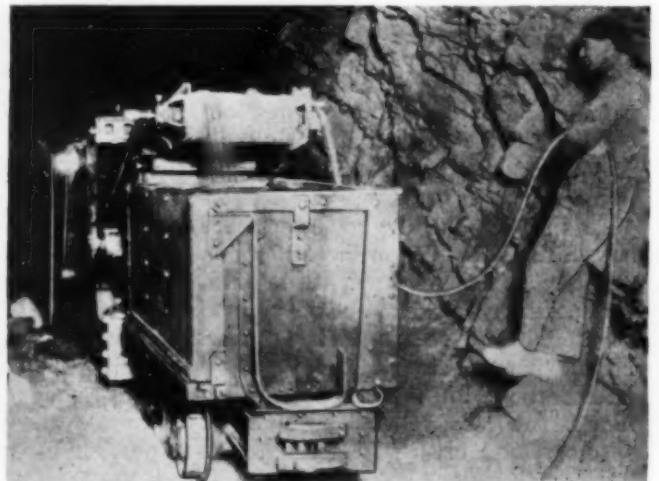
Driving progress jumped from 4 or 5 ft. a day to an average of 17 ft.

after the Lewis girder was installed. Timbering and excavation costs were cut in half, and \$3,000,000 estimated saved.

Of other machines developed, Mr. Betts, office engineer, writes: "A drill carriage on wheels and mounting four drills, cut down the set-up time from 40 to 15 minutes. An electric mucking machine, with belt conveyor, loaded 2-yd. cars in two minutes, saving both time and cost over hand mucking. An air-hoist car switcher facilitated moving empty cars to the mucker. Outside in the timber yard a framing machine was devised to save labor costs and speed up progress."



**PASSING BACK THE MUCK.** Chute from belt conveyor inside Lewis girder discharges muck into cars on tunnel floor. Air hoist car switcher (at left) spots empties under chute.



**MECHANICAL EARTHWORM.** Rear view of Conweigh machine mucker. Belt carries muck from dipper at forward end, loading 2-yd. car in two minutes.



**DIPPER END** of Conweigh mucker handling spoil blasted from tunnel section.



# Tunnel (Continued)

## The Men

"You can't build a tunnel with love, affection and a book on engineering." —"Brick" Allen,  
Chief Inspector on Moffat Tunnel

**B**EHIND the story of every great achievement is the story of the men who made it possible. So it is with the Moffat tunnel.

Unusual co-operation marked the efforts of the contractors, engineers, and tunnel commission. Harmony prevailed, speeding the job to its successful termination.

The contractors, Hitchcock & Tinkler, brought wide experience in tunnel building to the job. F. C. Hitchcock was already widely known, with offices here and abroad; and C. C. Tinkler had built 18 miles of the Hetch-Hetchy water tunnel for San Francisco. Hand-in-glove with them worked the engineers. George Lewis, general manager of the tunnel commission and resident engineer after R. H. Keays resigned, aided by inventing the Lewis girder when caving rock threatened driving progress.

Clifford A. Betts, the office engineer, performed invaluable service for the tunnel. Besides other work he directed the survey of the line over the Rockies, which despite extraordinary difficulties, resulted in the headings meeting within a fraction of an inch when "holed through."

Aiding Betts were the two

James Cohig,  
Resident Engineer,  
West Portal



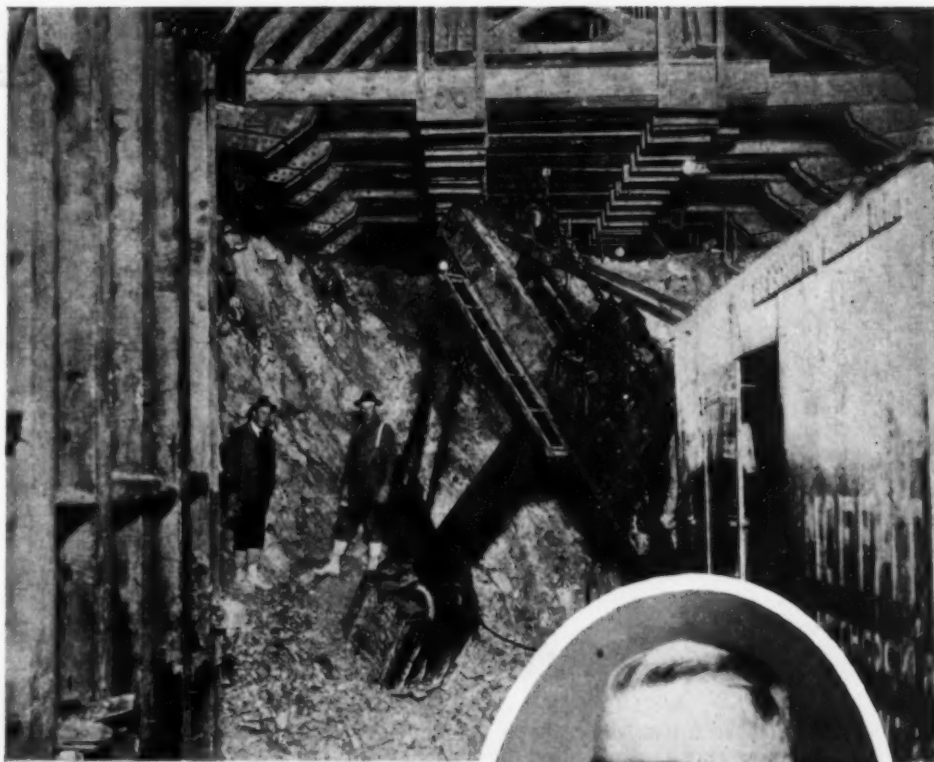
Major Burgess Coy,  
Resident Engineer, East Portal



Clifford Allen Betts,  
Office Engineer

resident engineers: Major Burgess G. Coy, an overseas veteran, at the east portal; and James F. Cohig, young Colorado State University man, at the west portal.

The consulting engineers for the Moffat Tunnel were D. W. Brunton, L. D. Blauvelt, J. Vipond Davies and J. Waldo Smith.



AIR SHOVEL excavates bench as Lewis girder supports tunnel roof above. George Lewis, inventor of girder, shown holding flashlight and also in insert.



Next month is the  
**RAILROAD SHOW**  
Chicago

So next month is the  
**RAILROAD ISSUE**

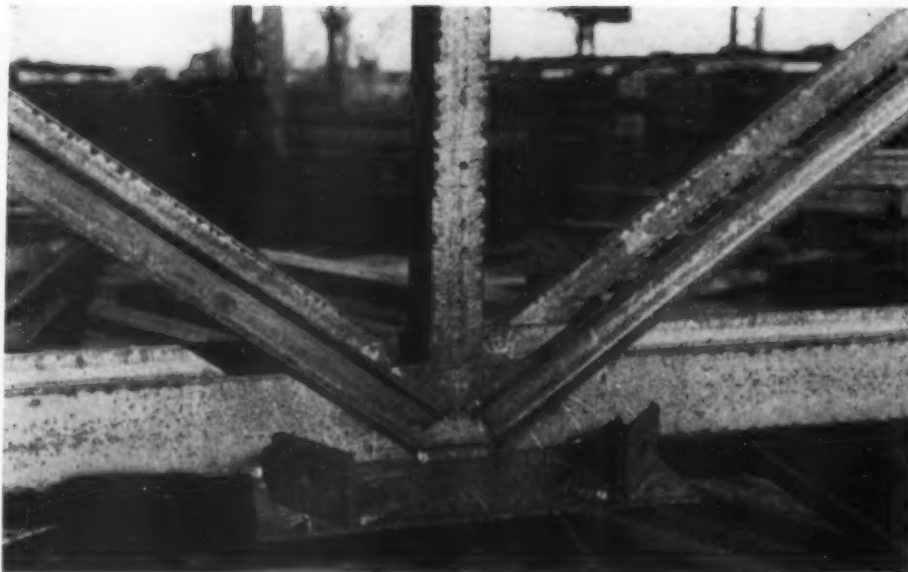
Special Features on  
Railroad Construction

SEE  
Realigning the  
Denver & Rio Grande Western

Noteworthy Methods of  
Straightening Right-of-Way

# Electric Welding

## *Engineers Witness*

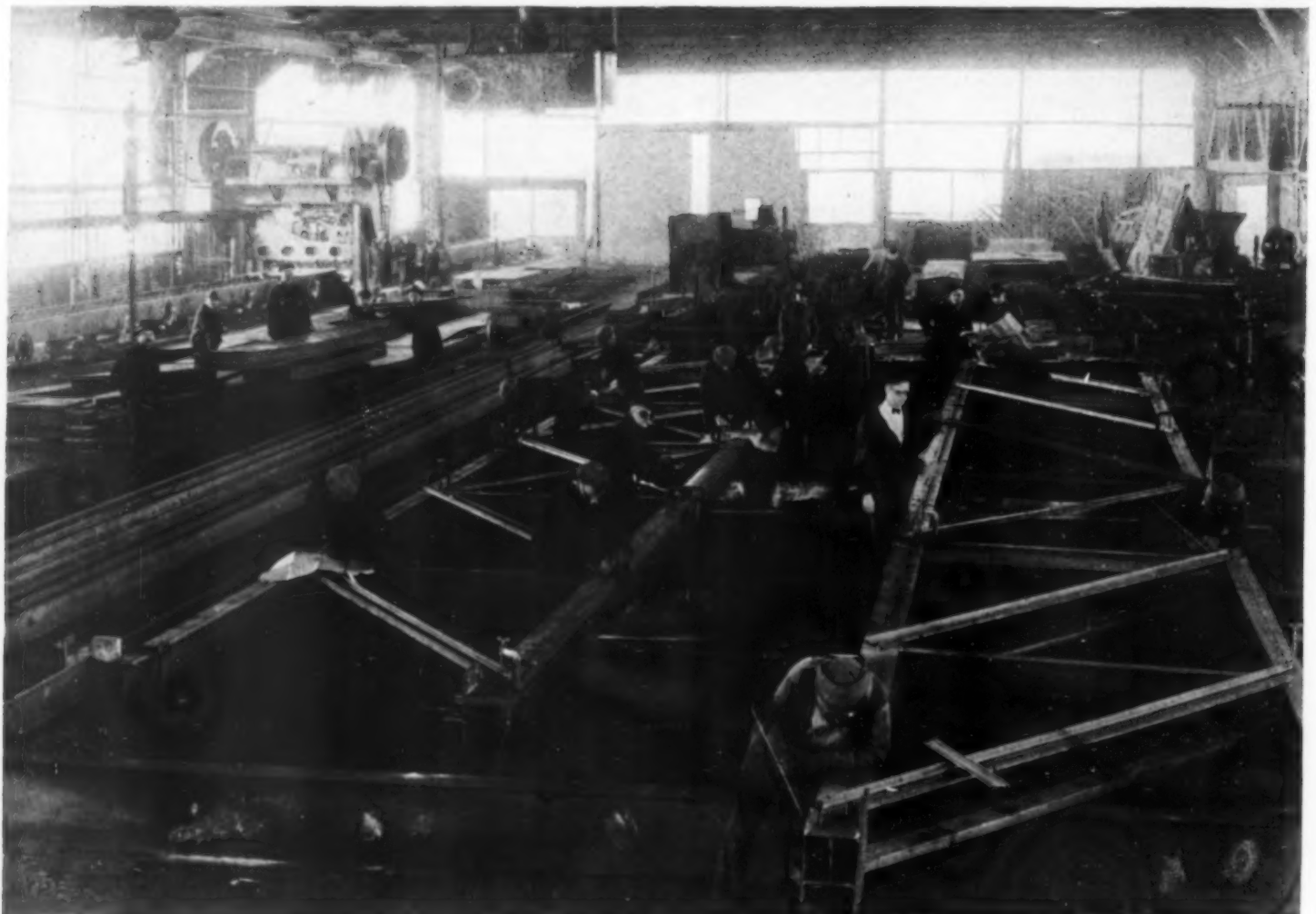


NO RIVETS HERE. Closeup of welded joints shows how connections are made. The welds are made in one continuous fillet. The lower chord member and the upright are H beams—the diagonal members are channels.

INTERESTED in electric welding of structural steel members, a group of technical men recently visited the works of the American Bridge Company at Trenton, N. J., and watched a test on a steel truss, fabricated entirely by welded connections. They also toured the shops, inspecting and contrasting the methods used in riveting and welding.

The 58-ft. truss tested was made with H beams for compression members and channels for tension members, these shapes lending themselves more readily to welding. It stood a 50 per cent overload with a deflection of slightly less than  $\frac{1}{4}$  in., which still left more than an inch of camber in the truss.

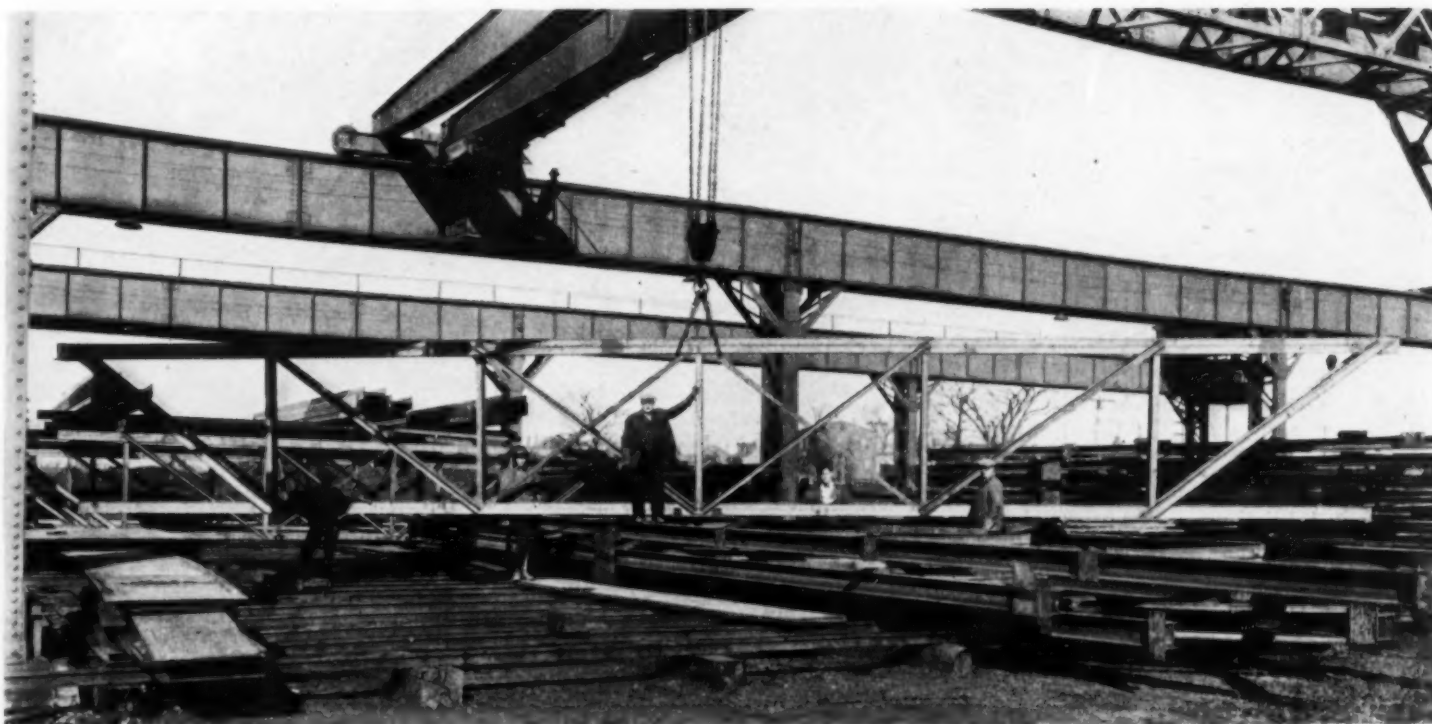
In making the truss, workmen used the fusion welding process, in which an electric arc melts away a metallic rod held at the surfaces to be joined.



WELDERS WORKING in the shop. Note the masks. Clamps hold the joints as heat of electric arc melts end of metallic rod.

# of Structural Steel

## *Test on Non-Riveted Truss*



HOISTING THE WELDED TRUSS into place for final test.

The metal deposits in a fillet along the joint, fusing the two surfaces together. Each joint is made in a single pass.

Advocates of welding, which is still in an early stage compared to riveting, claim savings in cost of 10 to 20 per cent over riveted construction.

As the loss of effective metal in riveting is equal to a strip of metal the full length and thickness of the punched member, it is claimed the welded truss is 12 to 15 per cent lighter than a riveted truss of equal strength.

Tests made on fillet welds indicate that, when made with a specific current and electrode, they have just as definite holding strength as rivets. At Rensselaer Polytechnic Institute, specimen tests showed average ultimate loads in pounds per lineal inch for  $\frac{1}{4}$ -in.,  $\frac{3}{8}$ -in., and  $\frac{1}{2}$ -in. fillets, of 10,500, 12,000 and 13,000 lb. respectively. Tests in both tension and compression were made on the rivets.

The above tests indicate that, with a factor of safety of four, safe allowable design loads for the sizes of fillet welds used will be 2,600, 2,900 and 3,200 lb. per lineal inch.

## Is This a Paving Record?

**R**ECORDS come and records go! Now Florida flips her Panama into the ring.

"My crew finished 1,806 lin.ft. of pavement 18-ft. wide, in one day," wires S. S. Swasey, contractor on a state highway near St. Augustine, Fla. He thinks he's hung up a new mark. What do you think about it?

Swasey's road was 9:6:9 in section, and nine miles long. He used four Plymouth gas locomotives to keep his concrete moving on a six-mile haul. He poured with a 27-E Koehring paver. On the record day his crew tumbled out at 5 a.m. and hit the ball till 9 p.m.

1,806 ft. in 16 hrs.!

Next?



WITH THIS EQUIPMENT Florida contractor poured 1,806 lin.ft. of pavement 18 ft. wide in one day. He claims a record.

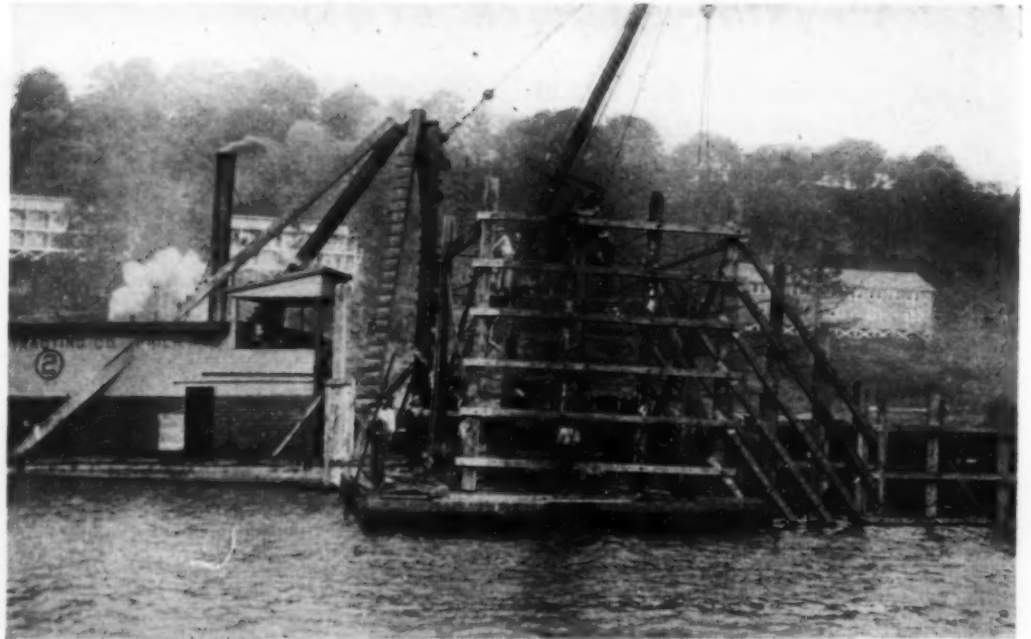


# Here's Where Our *Prize*

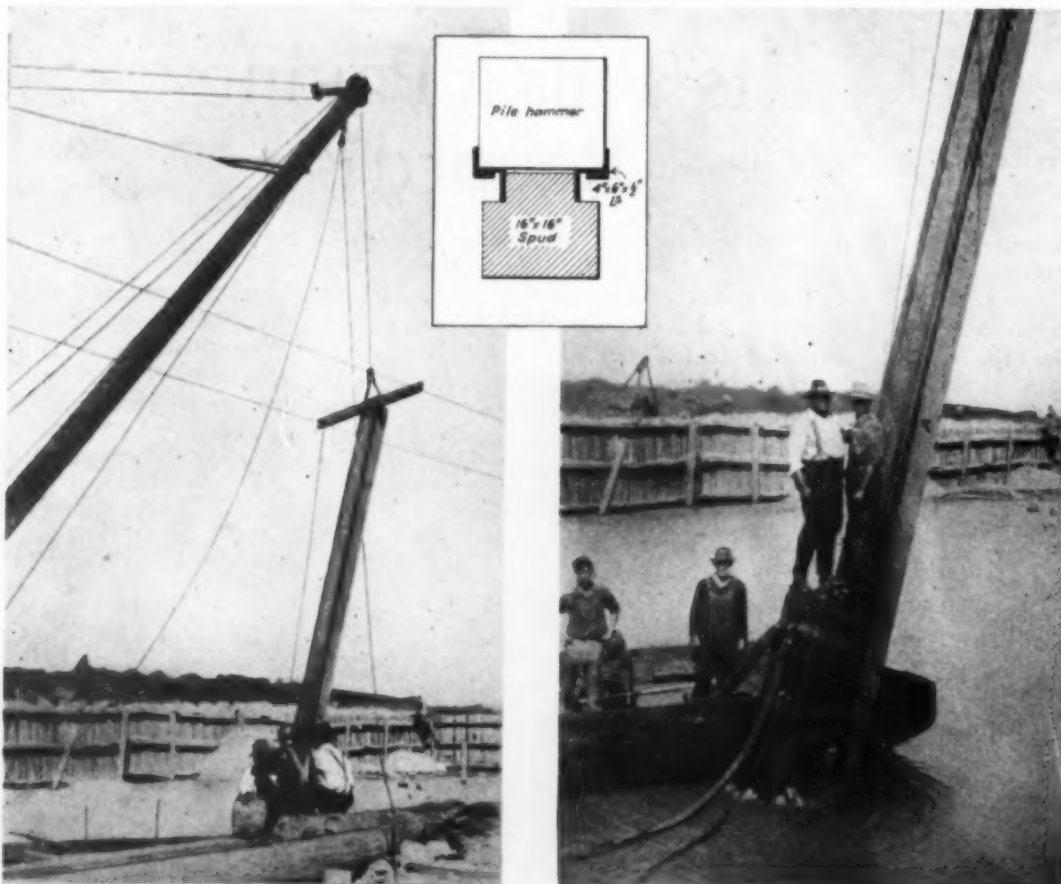
*First Prize*

\$25<sup>00</sup>

WON BY  
George S. Lamphere  
Erecting Engineer  
U. G. I. Contracting Co.  
Sewickley, Pa.



## "A Pair of Cofferdam Kinks"



FOR COFFERDAM WALLS, as shown in upper picture, here's how the U. G. I. Contracting Co., has built *continuous* timber frames for Ohio River lock and dam construction. On two flat scows 2x10-in. vertical posts and 8x8-in. or 8x6-in. wales are framed by inserting, through holes bored at the intersections of the vertical and horizontal members, 1-in. steel rods 22 ft. long threaded on the ends and tightened up with bolts and washers to form a box-like cage, X-braced on each end. The frame is then picked up by slings from a derrick boat boom, the scows are moved laterally and the section is lowered and sheeted on the inside to receive the fill. Note how this construction allows the flexible frame to *fold up* while going down to place. Additional sections are joined up successively making the framework continuous.

FOR DRIVING BATTER PILES this submarine rig proved handy. It consisted of a 70-ft. timber spud 16x16 in. in section with 4x6x½-in. angle irons spiked to each side, forming guides which engaged similar angle irons strapped to either side of a McKiernan-Terry hammer. The slope was controlled by lines extending from a cross-arm at the top of the spud to a derrick boat mast.

# Money Goes This Month

## Second Prize \$15<sup>00</sup>

WON BY

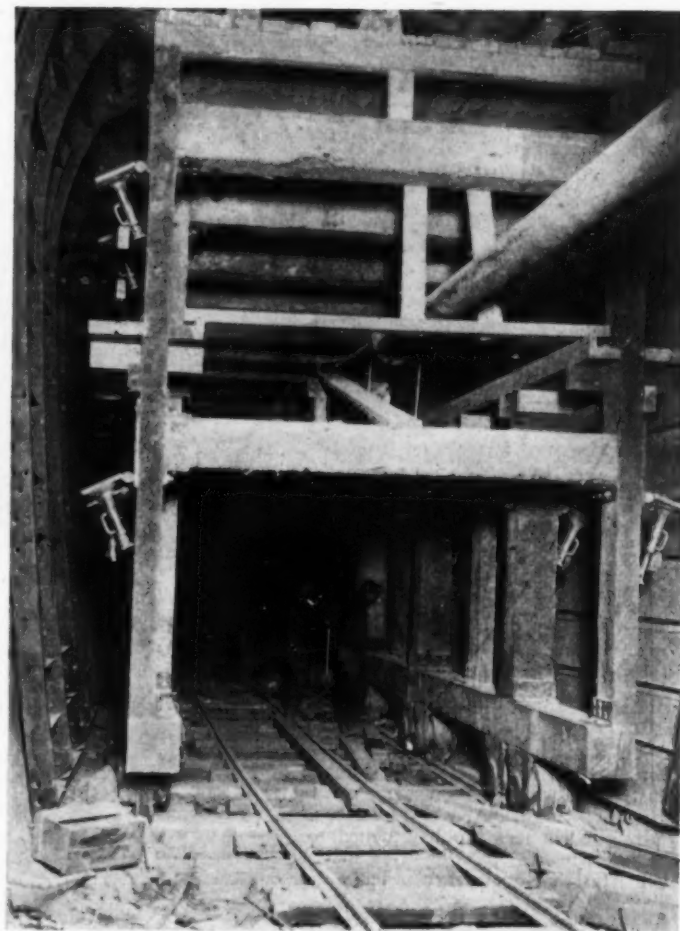
**Clifford A. Betts**

Office Engineer, Moffat Tunnel Commission,  
Denver, Colorado

### "Traveling Jumbo for Tunnel Forms"

TRAVELER, WITH JACKS ATTACHED, handled Blaw-Knox steel forms during concreting of Moffat tunnel under Rockies in Colorado. The jacks raised the forms into position.

About half of the 6-mile tunnel was driven through soft rock and required lining. For full story of this big tunnel job, see pages 20 to 23.



## Third Prize \$10<sup>00</sup>

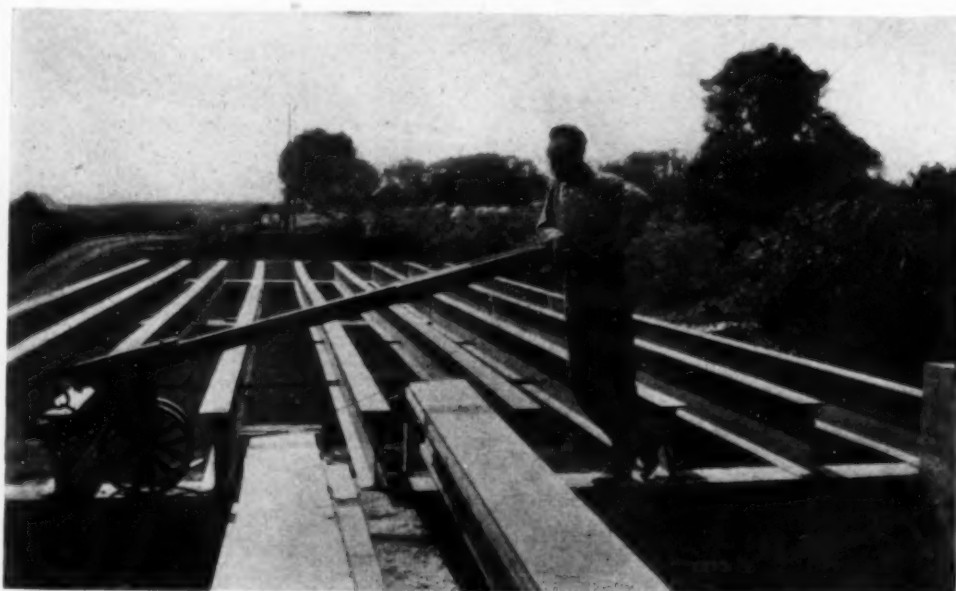
WON BY

**W. A. Barnhart**

of W. A. Barnhart Construction Company,  
Salem, S. D.

### "Circus Dolly Shifts Steel Beams"

We Make It  
a Bit Easier



"THIS CIRCUS DOLLY, used to pull and push steel beams into place on viaduct construction, saved both time and money for us," writes Mr. Barnhart. "Formerly we used either gin poles or falsework, but after we built two rigs like this one for \$15 two men did all the steel placing, handling 1,500-lb. beams with ease."

EVERY month *Construction Methods* awards three prizes of \$25, \$15, and \$10 for the most useful novel, and attractive pictures taken on construction jobs.

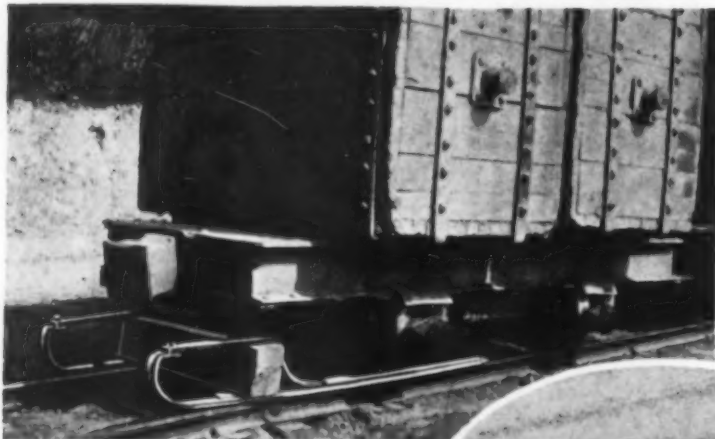
We want more and better pictures, so we're going to make it a little easier: the busy construction man can now get some one else to take the views of his job.

For the March contest, which closes February 10, the revised conditions are: Pictures must be submitted to *Construction Methods*, Tenth Avenue at Thirty-sixth Street, New York City, by a man regularly employed on the job, even though he may not have taken the pictures himself. The pictures should be plainly marked "Photographic Contest." Those received after February 10 will be entered in the April contest. *Construction Methods* will pay for all non-prize-winning pictures it uses.



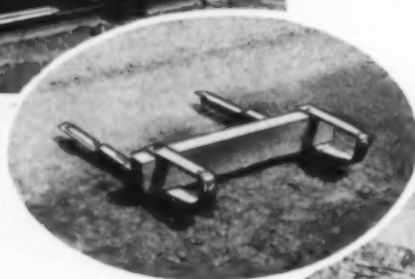
*Close-up*

THIS PICTURE  
WINS \$10 PRIZE



Taken by J. L. Harrison,  
Highway Engineer

*Above*—BOBSLED BRAKE holds industrial railway trains on steep grades during switching. Above 6 per cent grades the runners are lengthened to take both wheels. *At right*—STRONG BUT LIGHT—one man can carry it.



A LITTLE HIGHER,  
PLEASE! Crane boom  
extended with wooden  
beam for filling high  
forms on Vantage Ferry  
(Wash.) bridge piers.  
Kuckenberg & Wittman,  
contractors.



SCRAPER HANDLES GRAVEL in this Pennsylvania gravel plant. One rope on Sullivan portable electric hoist hauls scraper in, the other returns it for another load.



EVERY month this paper will award a prize of \$10 for the *best* picture received showing interesting and practical details of construction. All pictures used will be paid for at regular rates. Send some of *your* close-ups in to the editor.

## *Shots of Job Methods and Equipment*



*Above*—LAYING ELECTRIC LIGHT CABLE by using subsoiler. Cable is attached to blade and pulled under brick sidewalk by Caterpillar tractor.



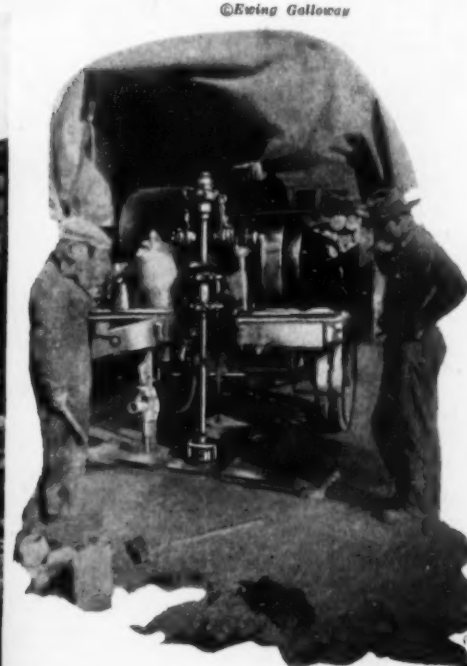
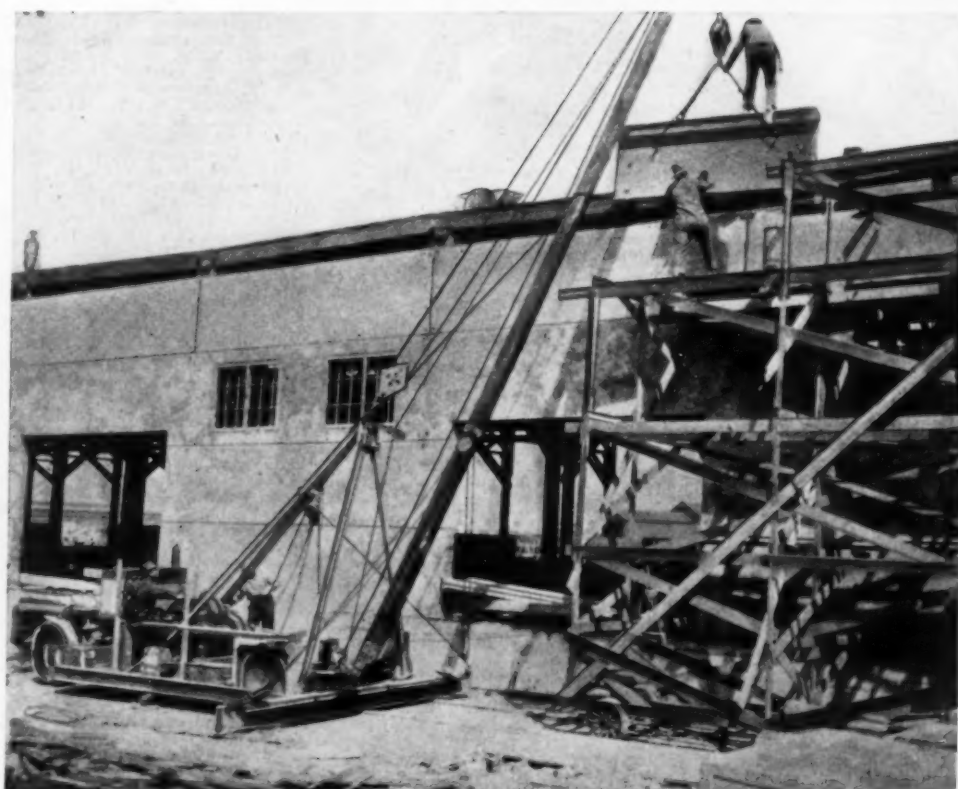
*Above*—EARTH MOVER, hydraulically operated from driver's seat, works like door hinge on grading job.



*Right* — EXTENDED BLADE ATTACHMENT on leaning wheel grader cuts ditch as grader shapes up shoulders on Iowa road.

*Below*—CORING MACHINE, driven by gas motor and mounted on truck, cuts test pieces from New Jersey highways.

©Ewing Galloway



*Left*—PORTABLE DERRICK mounted behind Fordson tractor handles precast concrete wall slabs for pier shed. Tractor has double winches, one for load and one for boom.

# Who's Getting the Big Contracts?

A Monthly Guide to Where the Construction Dollar is Being Spent

## Pacific Coast

**Los Angeles, Calif.**  
Grading & paving: \$704,000  
R. A. Watson, 1026 North McCadden Place, Los Angeles, Calif. \$636,205.  
**Los Angeles, Calif.**  
Candy factory: \$100,000  
S. A. Boyer, 372 Walnut Ave., Walnut Park, Calif.  
**Oakland, Calif.**  
Store: \$3,000,000  
P. J. Walker Co., Sharon Bldg., San Francisco, Calif.  
**San Francisco, Calif.**  
Apartment: \$750,000  
Dunwiddie Construction Co., Crocker Bldg., San Francisco, Calif.  
**San Francisco, Calif.**  
Apartment: \$300,000  
E. K. Nelson, 77 O'Farrell St., San Francisco, Calif.  
**San Francisco, Calif.**  
Medical building: \$35,000  
C. L. Wold, 185 Stevenson St., San Francisco, Calif.  
**Argo, Wash.**  
Bridge N. P. R.R. Co. \$230,000  
J. A. McEachern Co., Inc., Colman Bldg., Seattle, Wash.  
**California**  
Bridge, Santa Fe R.R. Co. \$400,000  
Missouri Valley Bridge Co., Leavenworth, Kans., and U. S. Steel Products Co., Rialto Bldg., San Francisco, Calif.  
**Los Angeles, Calif.**  
Sewers: \$214,040  
J. Artukovich, 684 East 50th St., Los Angeles, Calif.  
**Los Angeles, Calif.**  
Museum: \$612,800  
Clinton Construction Co., 639 So. Spring St., Los Angeles, Calif.  
**Stage, Calif.**  
Chemical plant: \$250,000  
R. T. Orendain, Const. Manager, Western Industries Co., 110 Sutler St., San Francisco, Calif.  
**Redlands, Calif.**  
Theatre: \$250,000  
H. I. Beller Construction Co., 6519 Hollywood Blvd., Los Angeles, Calif.  
**San Diego, Calif.**  
Grading, curbing, etc.: \$763,232  
L. R. Ford, East San Diego, Calif.

## West of Mississippi

**Texas**  
Oil pipe line: \$7,000,000  
Illinois Pipe Line Co., Midland, Texas  
**Oklahoma**  
Oil pipe line: \$2,000,000  
Sinclair Pipe Line Co., Mexia, Tex.  
**Del Rio, Texas**  
Storage tanks: \$2,000,000  
Mount Cooper Boiler & Iron Works, Del Rio, Tex.  
**Idaho**  
Relocation, Gt. Northern R.R. Co.: \$500,000  
Morrison & Knudsen, Spokane, Wash.  
**Missouri**  
Table Rock Dam and Power plant: \$25,000,000  
Empire Dist. Elec. Co., 66 Wall St., New York, N. Y.  
**St. Paul, Minn.**  
Factory: \$250,000  
Struchen & Romer Co., 655 Shubert Bldg., St. Paul, Minn.  
**Inglelake, Texas**  
Oil refinery: \$500,000  
Humble Oil & Refining Co., Frost Bldg., San Antonio, Texas  
**Corpus Christi, Texas**  
Hotel: \$500,000  
McKenzie Const. Co., San Antonio, Tex.

## The MAN and the JOB

ON THIS PAGE Construction Methods presents a new feature intended to give the field men of construction and industry a picture of the high-spot jobs for which important contracts have recently been let and their distribution by territories.

If the work where you are located is closing down, if you are looking for an opening with a contractor in new territory, the information on this page may be of help to you in indicating where construction is active.

The contracts listed herewith are, of course, only a few of the total number recently let. You may wish to ask about others. If so, address your inquiries to:

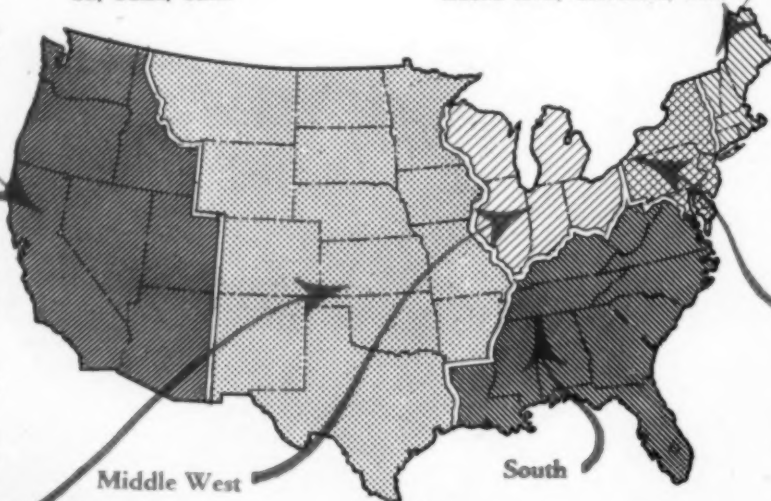
The Editor, Construction Methods,  
Tenth Ave. at 36th St., New York

## Iowa

Highways: \$2,268,910  
C. F. Lytle Constr. Co., 625 Finance Bldg., Sioux City, Ia. \$1,639,626  
**Minnesota**  
Highways: \$875,723  
Nolan Bros., 18 Northrod St., Minneapolis, Minn. \$691,705.  
**Tulsa, Okla.**  
Office: \$564,240  
Schallenger, 1631 E. Sixth St., Tulsa, Okla.

## Connecticut, Ohio

Channel dredging: \$100,000  
L. A. Wells Construction Co., 30 Euclid Arcade, Cleveland, O.  
**Cincinnati, Ohio**  
Viaduct: \$1,851,829  
Folwell-Ahliskog Co., 323 North Michigan Ave., Chicago, Ill.  
**Cleveland, Ohio**  
High school: \$1,294,907.  
W. G. Schirmer Co., 1720 Euclid Ave., Cleveland, Ohio



## Middle West

**Michigan**  
Detroit-Ontario Subways: \$10,000,000  
Parklap, Inc., 506 Marquette Bldg., Detroit, Mich.  
**Mt. Washington, Ohio**  
School: \$1,500,000  
M. J. Roche Construction Co., Southern Bank Bldg., Cincinnati, O.  
**Detroit, Mich.**  
Waterworks: \$779,901  
J. A. Mercler, 616 Hammond Bldg., Detroit, Mich.  
**Milwaukee, Wis.**  
Hospital: \$1,350,000  
Theodore Stark & Co., 130 Muskego Ave., Milwaukee, Wis. \$425,000  
**Chicago, Ill.**  
School: \$1,000,000  
W. E. O'Neill Construction Co., 19 So. La Salle St., Chicago, Ill.  
**Chicago, Ill.**  
Apartment: \$3,000,000  
Turner Construction Co., 228 North La Salle St., Chicago, Ill.  
**Chicago, Ill.**  
Office: \$2,000,000  
Hegeman-Harris Co., 431 North Michigan Ave., Chicago, Ill.  
**Chicago, Ill.**  
Sewage Pumping Station: \$2,145,000  
Tulley & Costello, 30 North La Salle St., Chicago, Ill.

## South

**Alabama**  
Highway bridges: \$1,315,281  
Penton & Mathis, Florala, Ala. \$106,010  
**New Orleans, La.**  
Excavation, 5,000,000 cu.yd. along lake front: \$980,000  
Orleans Dredging Co., Marson Blanche Bldg., New Orleans, La.  
**Melville, La.**  
Bridge over Atchafalaya River: \$1,000,000  
Mississippi Valley Bridge & Iron Co., Leavenworth, Kan.  
**Tennessee**  
Highways: \$874,166  
Peterson & Barnhart, Montgomery, Ala. \$239,399  
**Alabama City, Ala.**  
Power plant: \$3,000,000  
Dwight P. Robinson, Inc., 129 East 46th St., New York, N. Y.  
**Athens, Tenn.**  
Knitting Mills: \$300,000  
T. Sherman, Athens, Tenn.  
**Montgomery, Ala.**  
Hotel: \$1,000,000  
Hugger Bros. Construction Co., Montgomery, Ala.  
**Nashville, Tenn.**  
Hospital: \$200,000  
Foster & Creighton Co., 4th & 1st National Bank Bldg., Nashville, Tenn.  
**Kentucky & Virginia**  
Railway (L. & N.), \$2,500,000  
W. W. Boxley & Co., Roanoke, Va.

## New England

**Massachusetts**  
Paving State Highway: \$400,779  
Kelliher Corp., Turners Falls, Mass. \$137,018  
**Boston, Mass.**  
Store: \$5,000,000  
Hegeman-Harris Co., 100 Milk St., Boston, Mass.  
Store: \$1,000,000  
Hegeman-Harris Co., 100 Milk St., Boston, Mass.  
**Springfield, Mass.**  
Hotel: \$1,000,000  
E. J. Pinney, Inc., 225 Dwight St., Springfield, Mass.  
**Somerville, Mass.**  
High school: \$820,000  
C. S. Cunningham & Co., 23 Central Ave., Lynn, Mass.  
**Hartford, Conn.**  
Arena: \$400,000  
Austin Co., 120 Broadway, New York City  
**Bridgeport, Conn.**  
Church: \$500,000  
W. R. Muirhead & Son, 541 Maple St., Bridgeport, Conn.  
**Boston, Mass.**  
Apartment: \$300,000  
L. F. Kaufman, 43 Fremont St., Boston, Mass. (owner)  
**Waltham, Mass.**  
Hospital: \$843,990  
C. H. Cunningham & Sons Const. Co., 80 Boylston St., Boston, Mass.  
**Massachusetts**  
Paving: \$145,162  
C. E. Horne, Millbury, Mass.  
**Rhode Island**  
Paving: \$354,207  
Lane Const. Corp., 37 Colony St., Meriden, Conn. \$103,233  
**Providence, R. I.**  
College: \$400,000  
Bouvier-Brien Construction Co., 189 Sayles St., Woonsocket, R. I.

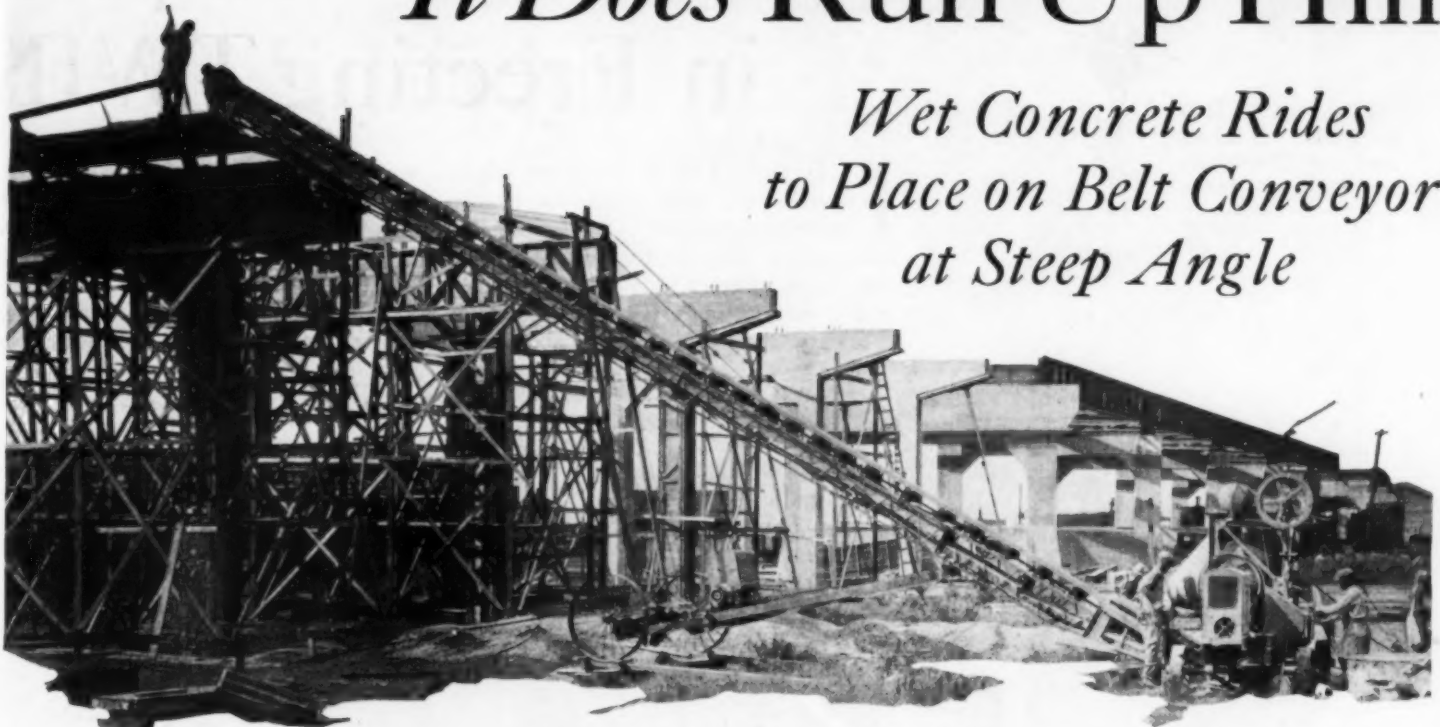
## Middle Atlantic

**Philadelphia, Pa.**  
Bridges: \$342,920.  
Vare Construction Co., 1120 Race St., Philadelphia, Pa.  
**Hadley, N. Y.**  
Conkingville dam: \$9,000,000  
S. J. Groves & Sons Co., Ticonderoga, N. Y. \$1,307,086  
**New York, N. Y.**  
Hotel: \$3,000,000  
Shroder & Koppel, 420 Lexington Ave., New York, N. Y.  
**Baltimore, Md.**  
Apartment: \$1,000,000  
Consolidated Eng. Co., 20 E. Franklin St., Baltimore, Md.  
**Washington, D. C.**  
Hotel: \$4,000,000  
J. A. Stewart Co., Inc., 17 East 42nd Street, New York City  
**Long Island City, N. Y.**  
Subway: \$5,195,284  
Atwell, Gustin & Morris Co., 1 Park Ave., New York City  
**Deep Water Point, N. J.**  
Steam power plant: \$11,000,000  
Stevens & Wood, Inc., 120 Broadway, New York City  
**New York, N. Y.**  
Office: \$3,500,000  
Courtlet Realty Corp., 263 Seventh Ave., New York City  
**New York, N. Y.**  
Highways: \$1,884,027  
Stewart Land & Gravel Corp., Binghamton, N. Y. \$382,710  
**New Castle, Pa.**  
Bridge over Beaver River: \$312,865  
M. J. McMahon, Du Bois, Pa.  
**Baltimore, Md.**  
Pier: \$896,150  
Merritt, Chapman & Scott, 17 Battery Place, New York City  
**New York, N. Y.**  
Apartment: \$2,500,000  
Corporation, J. R. Barr, Pres. (Owner and contractor), 347 Madison Ave., New York City



# It Does Run Up Hill

*Wet Concrete Rides  
to Place on Belt Conveyor  
at Steep Angle*



UP IT GOES! This 65-ft. portable belt conveyor elevated wet concrete 34 ft.

**W**ET concrete riding upward on a belt is the construction feature of the Seventh St. viaduct at Decatur, Ill. D. E. W. Jones, of the Jones Engineering & Construction Company, Chicago, used this method to deliver concrete for the pier bents, averaging

34 ft. above the ground, of the 2,700-ft. long reinforced concrete viaduct.

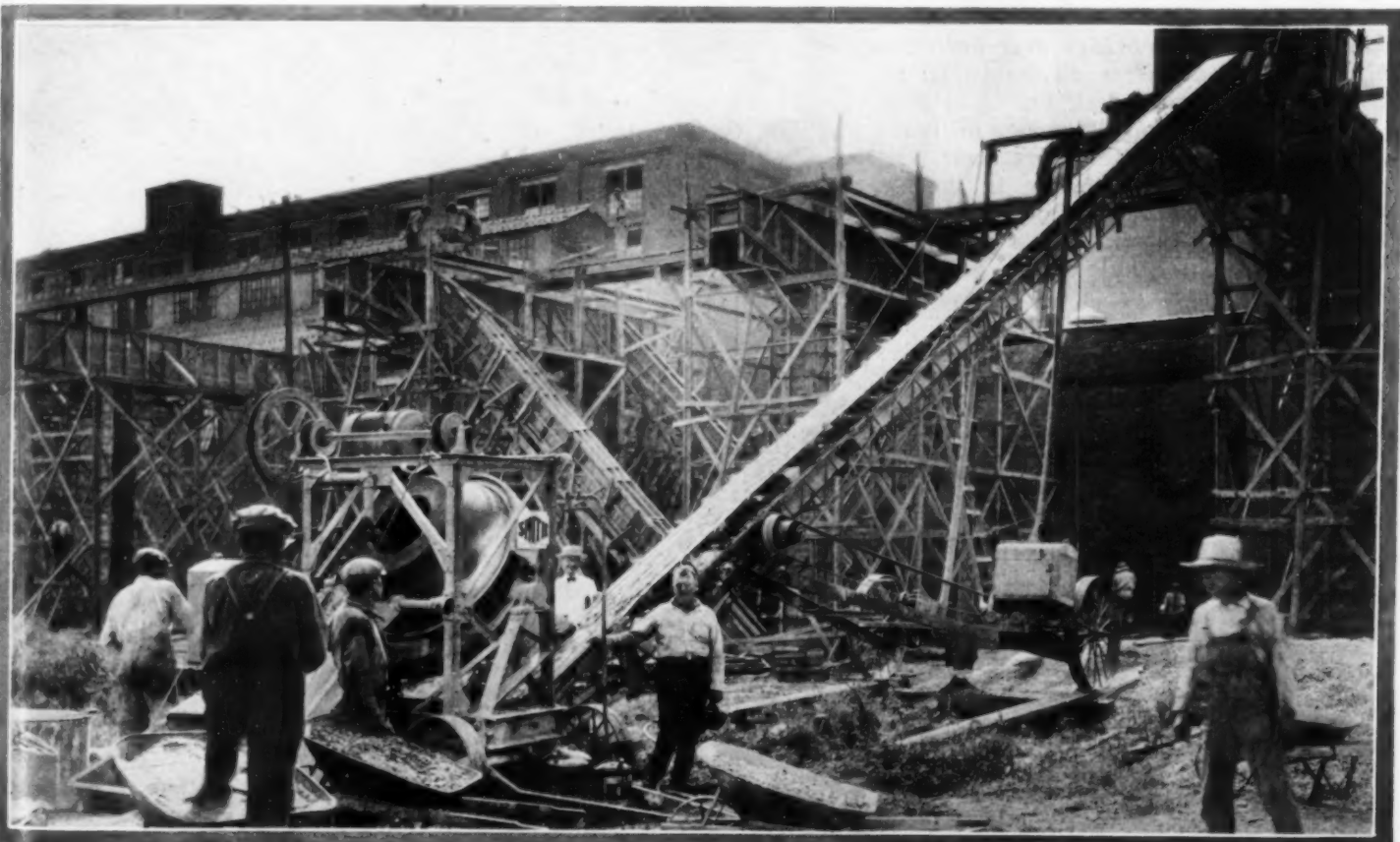
In the 60 pier bents the reinforcing steel is only  $\frac{3}{4}$  in. from the surface, making a wet, plastic mix desirable. Mr. Jones chose a 1:1 $\frac{1}{2}$ :2 mix, with 1-in. stone the maximum size. This gave concrete with a 5 $\frac{1}{2}$ -in. slump,—a pliable, flowing, easily-worked mixture.

For raising it from his mixing plant to the forms he chose two Barber-Greene belt conveyors, one of which is

shown in pictures on this page. It is 65 ft. long and rises on an angle of 31 deg. The concrete rode up without spilling, and produced a finish of even texture.

Warren & Van Praag, of Decatur, Ill., were the consulting engineers.

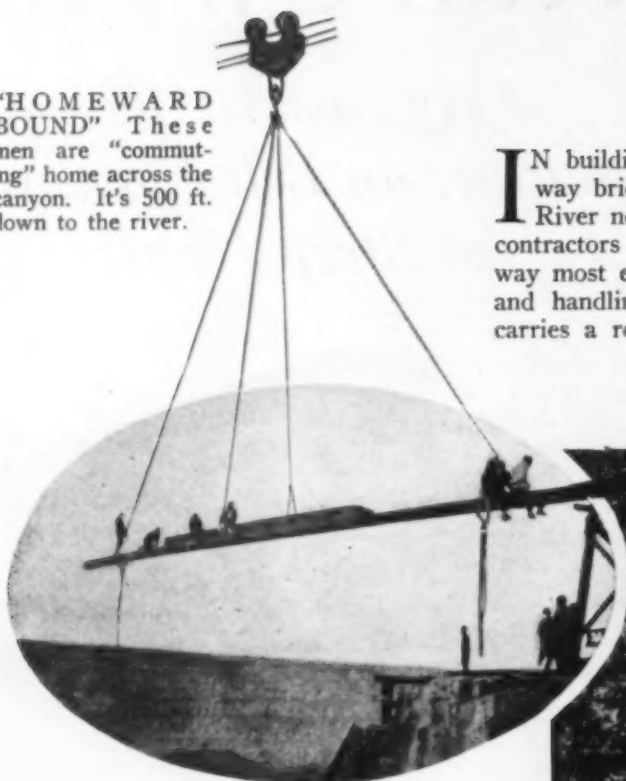
**CONCRETE MOVING SKY-WARD.** D. E. W. Jones, superintendent, takes off his hat as concrete goes up 31-deg. slope.





# CABLEWAY Conquers in Erecting TWIN

"HOMEWARD BOUND" These men are "commuting" home across the canyon. It's 500 ft. down to the river.



IN building a steel cantilever highway bridge, high above the Snake River near Twin Falls, Idaho, the contractors used a temporary cableway most effectively for placing steel and handling materials. The bridge carries a roadway, 476 ft. above the

water, eliminating the old canyon trail. Supported by steel towers on reinforced concrete piers, it connects Twin Falls with Jerome, both thriving county seats.

The name "Murray" looms large in the construction history of the bridge.

## "Highest of All"

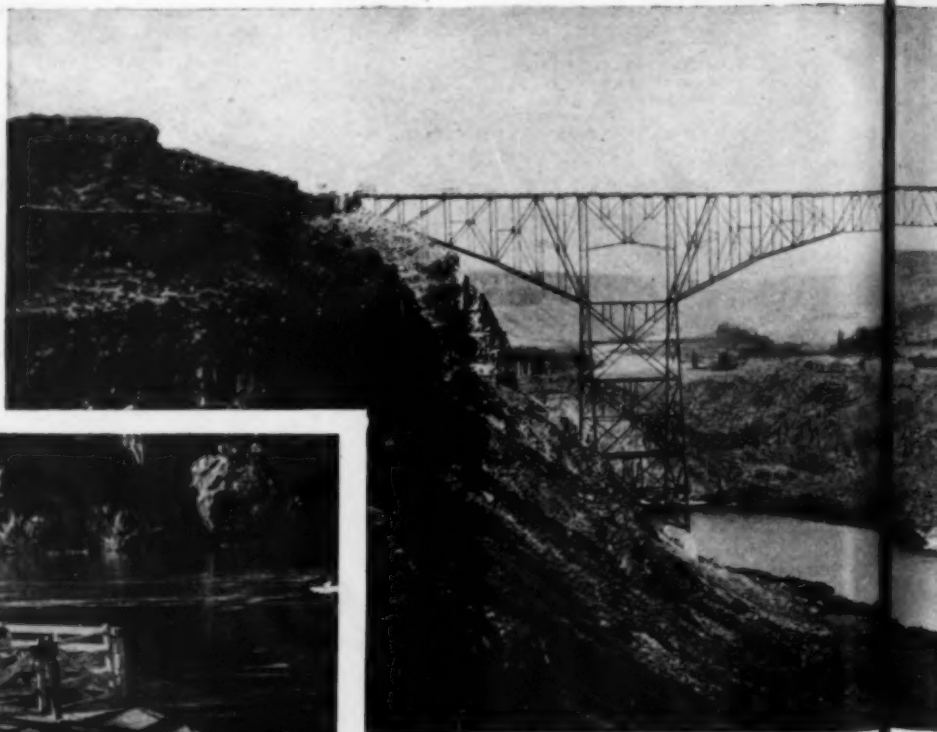
*Says Designer*

"AFTER a careful search through engineering literature on various high bridges in existence, I believe this structure is the highest bridge ever built for highway or railroad traffic," says R. M. Murray, locater and designer of bridge.

"The roadway is 476 ft. above ordinary water level, and 502 ft. above river bed.

"The next highest bridge is the St. Guistans in the Tyrol, which is 453 ft. above the water. Next comes the Fades Viaduct over the Sioule River, France—435 ft. high; and next a bridge over the Zambesi in Africa—420 ft. above the water."

ALL SET for the top steel! With main towers completed, cableway starts placing steel for anchor arms. It swings 1,525 ft. in the clear between the two wooden towers, each 125 ft. high.



Left—THE OLD WAY—Shoshone Falls Ferry carried traffic across Snake River for many years.

Above level The

rs  
N

# Canyon FALLS Bridge

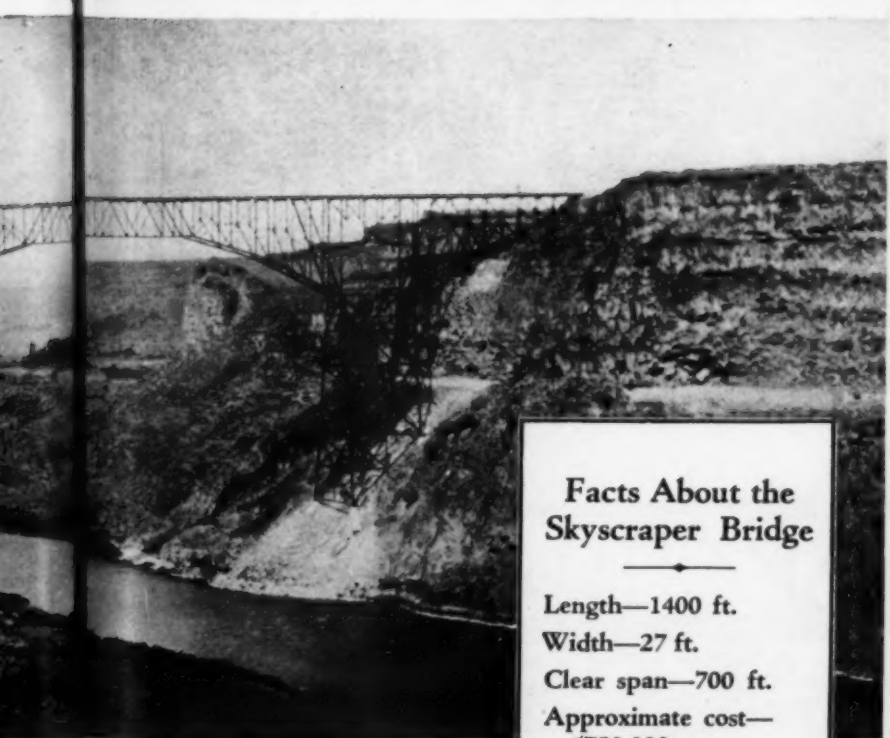
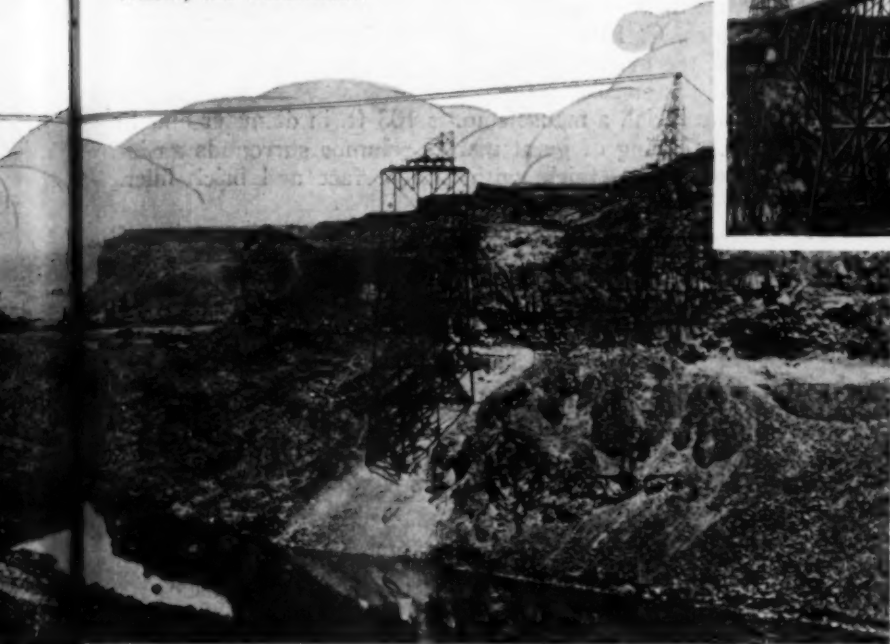
trail.  
rein-  
Twin  
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idge.

R. M. Murray, chief engineer of the Union Bridge Company, Portland, Ore., designed it; Samuel Murray of Portland was consulting engineer; and L. G. Murray superintended the construction for the Puget Sound Bridge & Dredging Company, of Seattle, Wash., the contractor.

[ Said to be highest traffic bridge  
in world—Replaces dangerous  
canyon trail and old ferry ]



GET THE FLAG READY! Travelers setting last members of suspended span at center.



## Facts About the Skyscraper Bridge

Length—1400 ft.

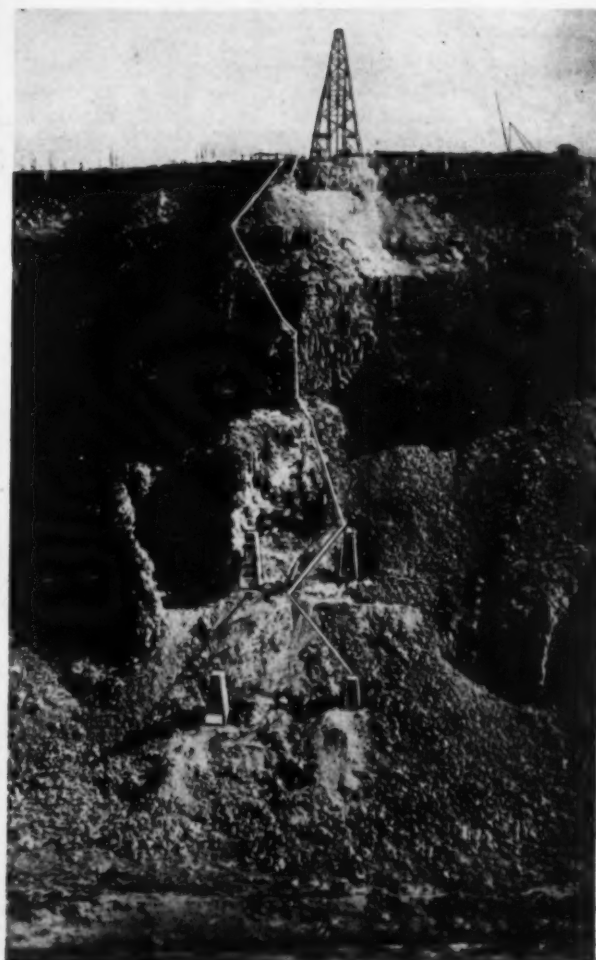
Width—27 ft.

Clear span—700 ft.

Approximate cost—  
\$750,000.

Begun—Nov. 1, 1926.

Finished—Sept. 1, 1927



"NO MAST NEEDED, THANKS!" Concrete drops 400 ft. to tower foundations.

ophone  
Snake

Above—THE NEW WAY—A level highway from rim to rim. The finished bridge.



# The Harding Memorial

## Contractors Complete Impressive Marble Mausoleum at Marion, Ohio

MARBLE  
UNLOADED  
from trucks, and  
stored ready for  
placing by derrick.

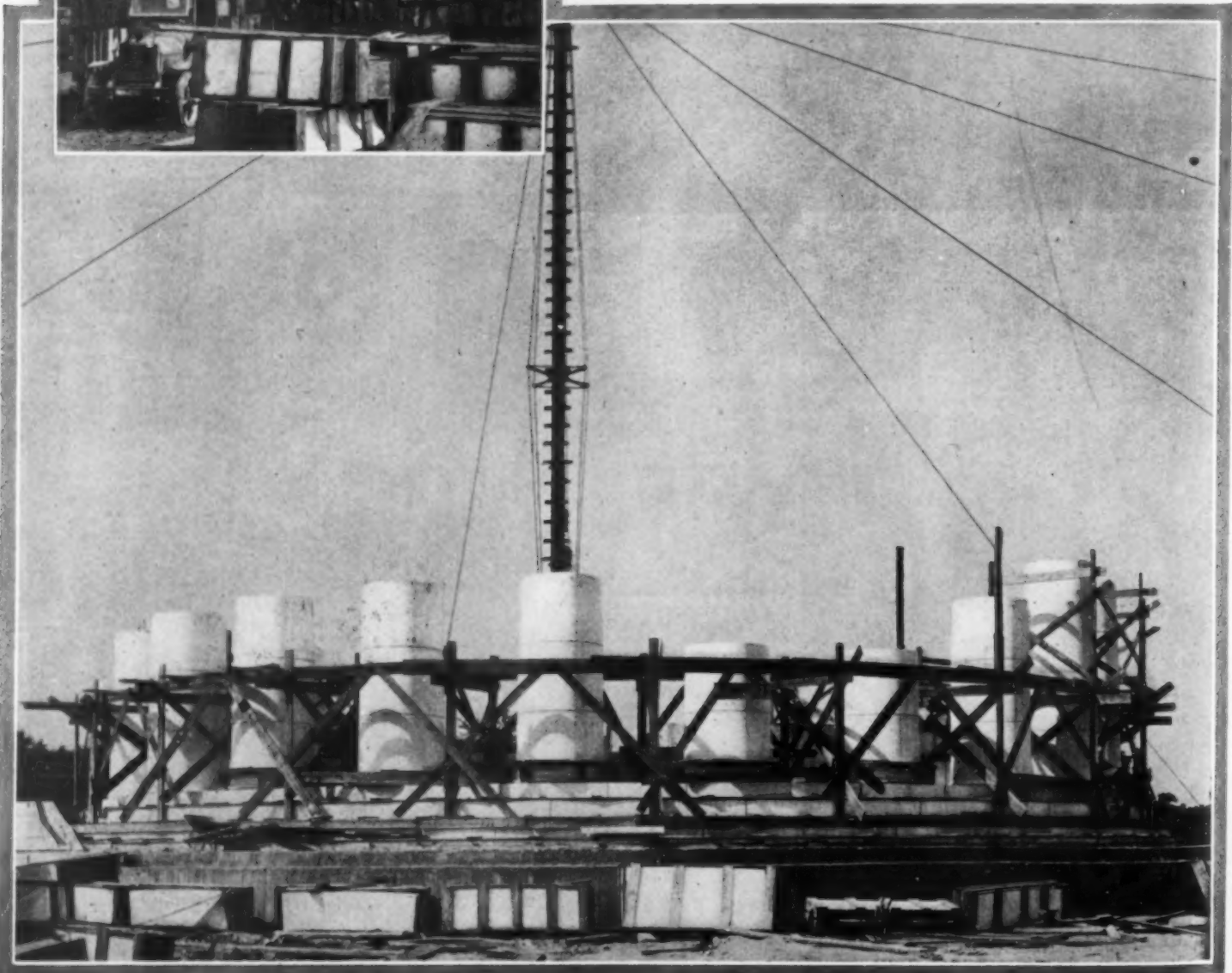


**I**N BUILDING a massive marble memorial to our late president, Warren G. Harding, at Marion, Ohio, the contractors, C. Elford & Son of Columbus, Ohio, handled nearly all the marble with a single guy derrick, set up at the center of the circular structure.

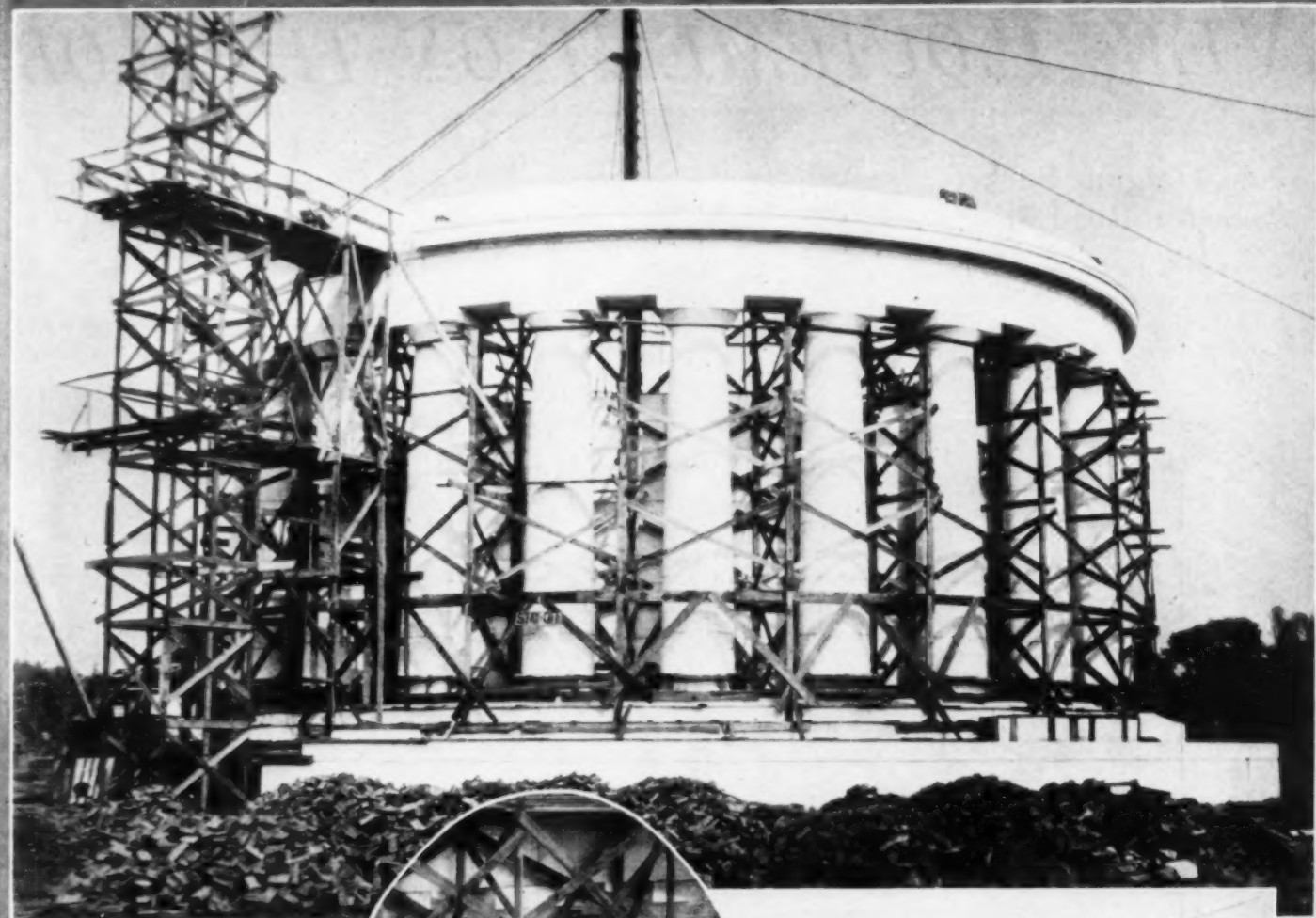
The memorial, a mausoleum, is 103 ft. in diameter and 53 ft. high. A ring of great marble columns surrounds an interior wall, 3 ft. thick, with marble face and brick filler. Smaller columns circle the inside.

Unloading and placing the marble taxed the ingenuity of

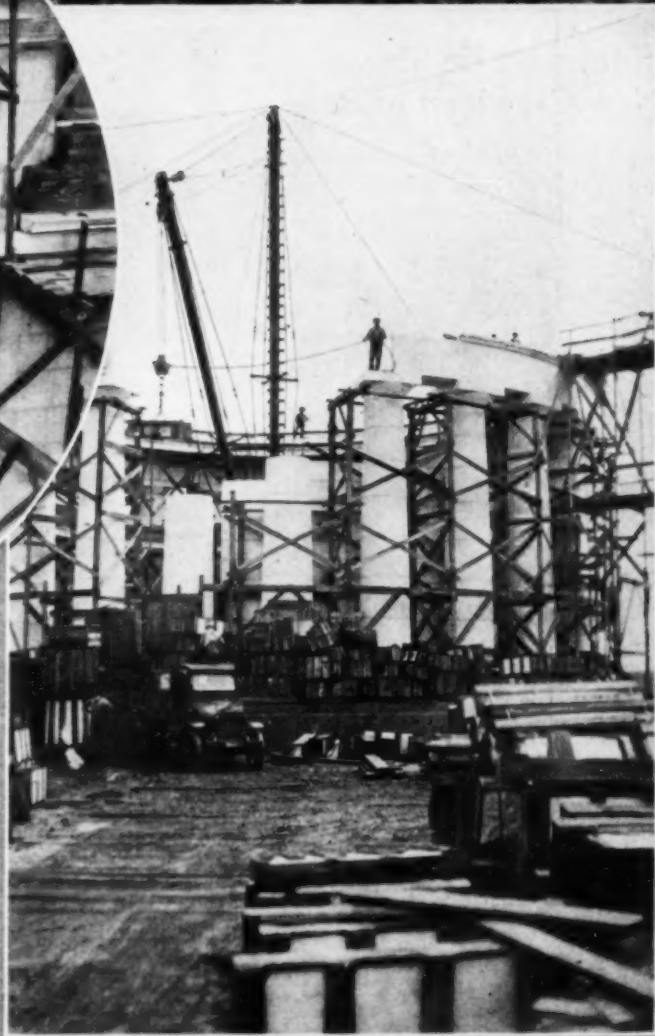
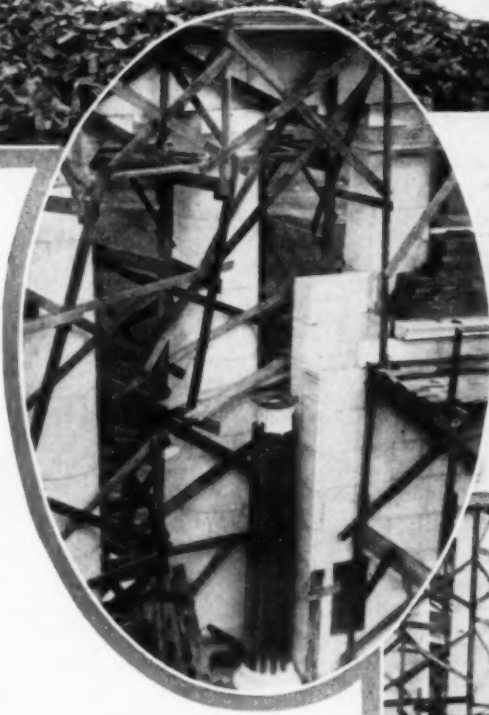
MASSIVE COLUMNS RISE, with guy derrick handling marble. Lower segments weighed almost 8 tons.







*Above*—EXTERIOR COMPLETED and tower erected for handling interior brick. *At right* — Building interior wall. Note brick filler. *Below* — Derrick handled nearly all marble.



C. H. Pruening, superintendent for the contractor, and A. M. Miller, superintendent for the Georgia Marble Co. of Nelson, Ga., to the limit; for 140 carloads of marble had to be carefully fitted into the classic structure. When the marble arrived on trucks, it was unloaded by the derrick and later swung into place as needed.

The derrick had a capacity of 10 tons,—none too great, for some of the column segments weighed nearly 8 tons. The derrick mast was 80 ft. high and its boom 70 ft. long. Both mast and boom were butt jointed in spiders and trussed with steel rods. A steam hoist supplied the power.

To design the mausoleum the Harding Memorial Association chose two Pittsburgh architects, Henry Hornbostel and Eric Fisher Wood. Work on the foundations began in April, 1926, and J. H. McClain, foundation superintendent, placed 3,000 cu.yd. of concrete in the footings, leaving all in readiness for the erection of the imposing structure recently completed.

# NEW EQUIPMENT ON THE JOB

## New Dragline Bucket Shown at Road Show

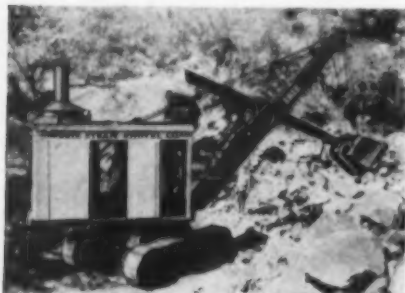
To overcome the tendency of dragline buckets to pull in at the sides during hard digging, the G. H. Williams Company, of Erie, Pa., have developed a "Double-Arch" bucket, which was on



view at the Cleveland Road Show. A heavy one-piece steel bridge across the top is reinforced by a heavy alloy steel digging lip. This takes care of all pulling in strains.

## Bucyrus-Erie Shows New Crawler Treads

One of the features of the Bucyrus-Erie exhibit at the Cleveland Road Show was their new "Single Shaft



Drive" crawler type mounting, which is standard equipment on their Gas + Air and B-2 steam machines. Simplicity and ruggedness are outstanding features of the design, and the

makers claim it is non-clogging, gives remarkable climbing power, and is easily accessible for inspection or repair. Of the four Bucyrus-Erie machines exhibited at the road show, three were supplied with the new crawler mounting.

## Truck Cranes to Have Extension Boom

A three-piece adjustable boom, with a total length of 52 ft., was one of the new truck crane attachments shown by the Universal Crane Company at the



Cleveland Road Show. It was developed by Universal engineers during 1927. The 52-ft. boom is the longest standard boom built for truck crane use. It is made up of a Universal standard 28-ft. boom with 8-ft. base and 16-ft. head extensions, both readily detachable to permit using shorter booms when more suitable. Besides the boom, Universal showed a new truck crawler attachment for converting the rear truck wheels into a crawler tread.

## Mack Has High Speed Heavy Duty Truck

With the addition of the new A-K model to its regular line, Mack Trucks, Inc., offers a unit which has speed and control possibilities as well as heavy



duty capacity. New features include a sharper turning circle, rubber shock insulated springs, motor cylinders cast in block with detachable aluminum heads, and transmission suspended in blocks of live rubber.

## Excavators to Have Diesel Engines

After experimenting for more than four years with many types of Diesel engines, made both here and abroad, the Harnischfeger Corporation of Mil-



waukee announces Diesel equipped excavators in 1-yd. and 1½-yd. sizes for shovels and draglines, and 1½- and 1½-yd. sizes for rehandling clamshell service.

The engines are of the four-cylinder type, with fuel oil injected mechanically instead of by air. The picture shows one of the Diesel-equipped shovels.

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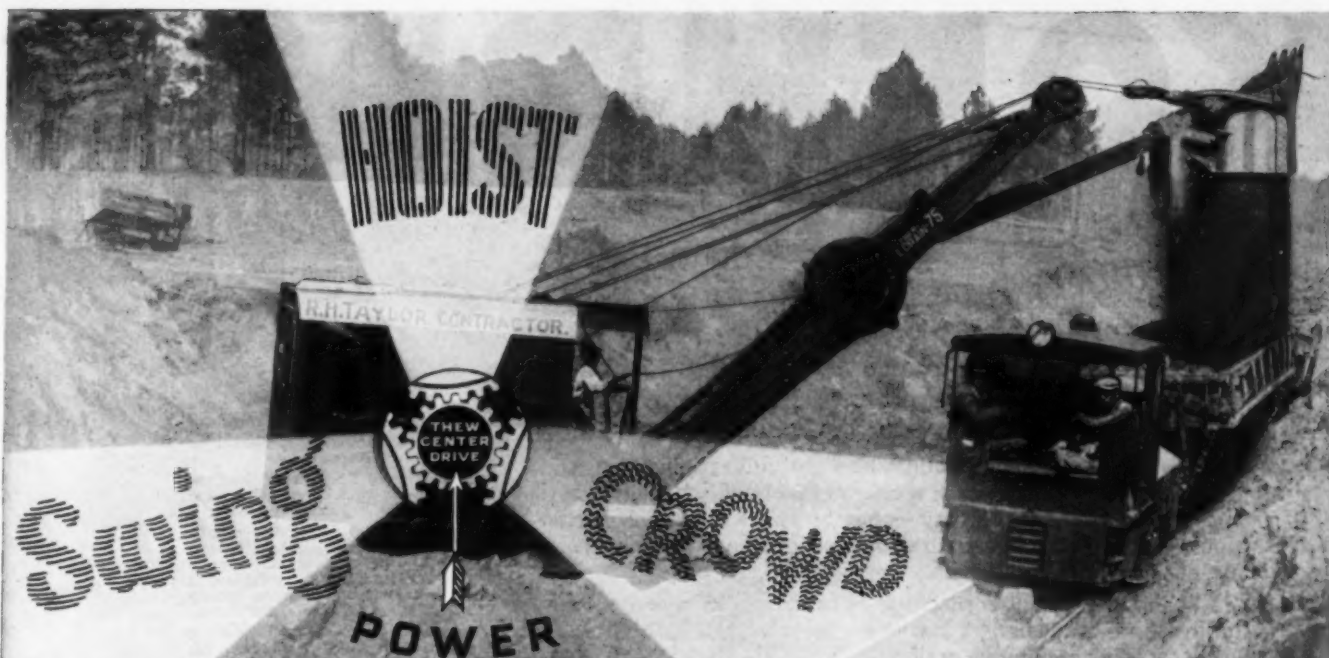
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Fewer parts of full size rugged construction gives freedom from costly break downs. Center Drive power plus fewer delays means greater profits.

Center Drive is an important factor in excavating and material handling work—let us send you full details.

**THE THEW SHOVEL COMPANY** - Lorain, Ohio  
Steam, Gasoline & Electric - Shovels - Cranes - Draglines

*Thew Center Drive applied to swing, hoist and crowd gives the same rugged service that has made Thew Center Drive Trucks famous.*

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Gasoline  
or  
Electric  
Powered

**LORAIN 60 AND 75**

Shovels  
Cranes  
and  
Draglines



# KOEHRING

## SPEED!



—SPEED built into the Koehring as never before in a crane!

—Seems to have a downright eagerness to hustle the job, just as some good cars at a touch of the controls seem to read your mind and leap to the job!

*Finger-tip control!* Sounds like an advertising slogan, doesn't it? But it's *real*, a *work day actuality!* And it's accomplished in a simple way — not by mechanical complications—but by clutches with enough friction area so that they almost operate themselves.

And then—the whole machine is tuned up to speed operation! Speed is designed into every gear and detail! *Speed*, and smooth, responsive action!

It's the crane built for the contractor who demands more than average *Results!* It's the crane for record breakers, and Koehring Heavy Duty construction means it stands up to all you ask of it—gives you reliability and long service life!

*Know the Koehring! Write for Bulletin Cr. 17*

**KOEHRING COMPANY** MILWAUKEE WISCONSIN  
PAVERS, MIXERS — GASOLINE SHOVELS, CRANES AND DRAGLINES

*Sales Offices and Service Warehouses in all principal cities*

*Foreign Dept., Room 1370, 30 Church St., N. Y.*

*Mexico, F. S. Lapum, Cinco de Mayo 21, Mexico, D. F.*

### Crane Capacities

*Based on 66⅔% of Overturning Load  
Quickly convertible to shovel or dragline.*

No. 301—10 Tons at 12' Radius.  
When used with clamshell bucket loaded with dry sand or gravel:

1 Yd. Bucket (weighing empty 3,450 lbs.) at 28' Radius, 40' Boom;  
¾ Yd. Bucket (weighing empty 2,600 lbs.) at 34' Radius, 45' Boom;  
½ Yd. Bucket (weighing empty 2,050 lbs.) at 41' Radius, 50' Boom.

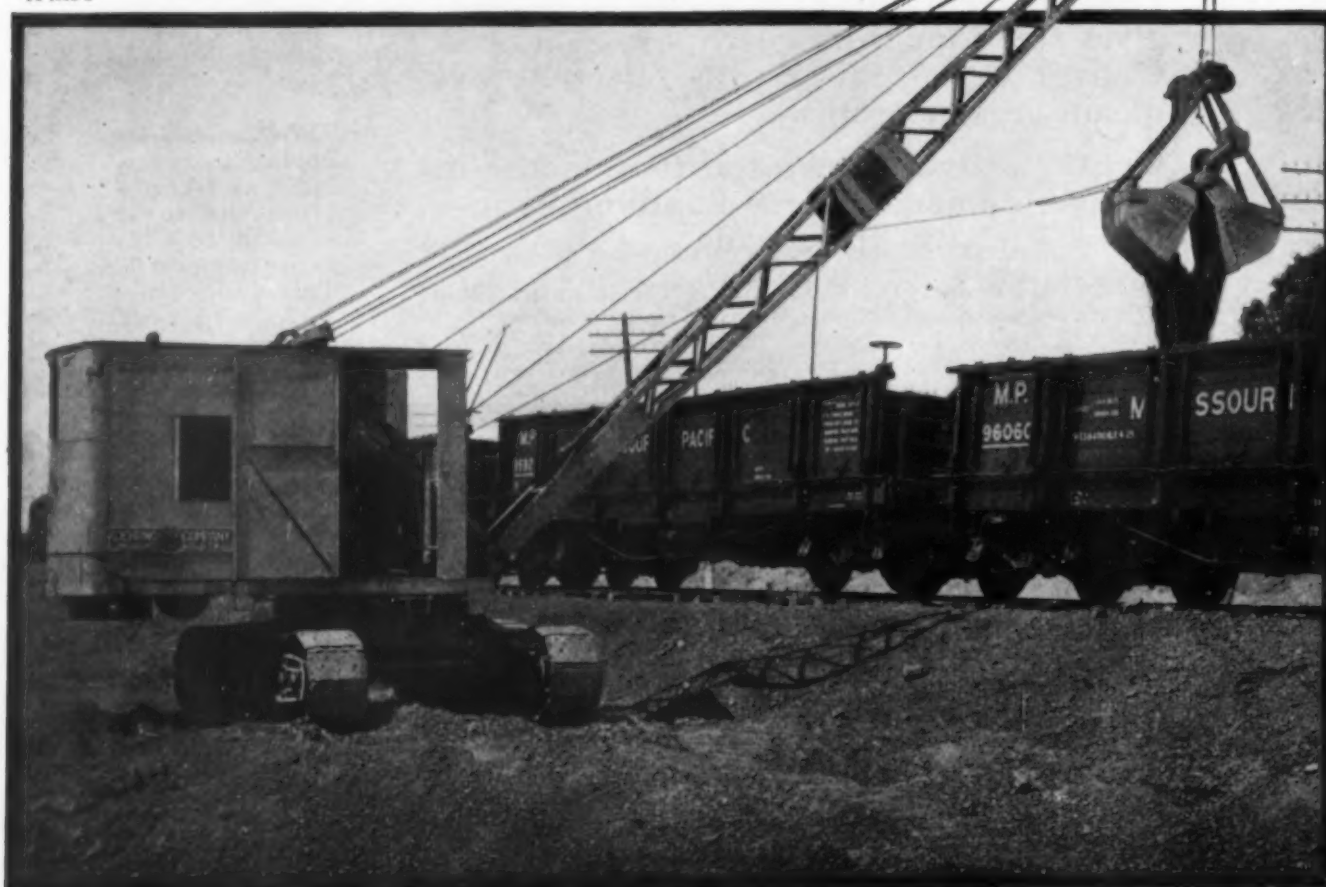
Wisconsin four cylinder gasoline engine, 5¼" x 6½", 1,000 R. P. M.

No. 501—17 Tons at 12' Radius.  
When used with clamshell bucket loaded with dry sand or gravel:

1½ Yd. Bucket (weighing empty 4,800 lbs.) at 31' Radius, 45' Boom;  
1¼ Yd. Bucket (weighing empty 3,950 lbs.) at 36' Radius, 45' Boom;  
1 Yd. bucket (weighing empty 3,500 lbs.) at 41' Radius, 50' Boom;  
¾ Yd. Bucket (weighing empty 2,800 lbs.) at 48' Radius, 55' Boom.

Wisconsin four cylinder gasoline engine, 6" x 7", 925 R. P. M.

A-4002-1



# "Far above them all!"

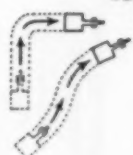


*Low friction gives high climbing power—All of the machine's weight is carried on two dead axles, which do not turn—the drive shaft carries only the propelling load.*

## It stands alone—for Better Performance, for Unequalled Simplicity and Reliability

**Absolutely non-clogging.** It sheds the dirt—even when dirt is shoveled into it, clears itself completely in a few feet of travel. And has no parts to drag—12-inch clearance underneath.

**A powerful climber—self locking.** Easily takes grades of 30% and steeper—its lower internal friction gives higher climbing power. And the "forget-proof" 2-way brake locks the machine on a hill, or against the digging thrust.

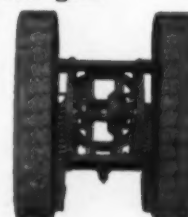


**SHARP turns as well as GRADUAL turns.** Just as easy to make a right-angle turn at a street intersection, as a long radius turn across a field. Steers from either end—going either forward or backward.

**The "last word" in Simplicity and Reliability.** Only one drive shaft and one gear below the deck! The one-piece annealed steel truck frame casting is 23 inches deep. Splined shafts—no keys.

**Perfect accessibility—**can take out any part for inspection or renewal, without removing any other part. No other mounting to compare with it for accessibility.

**Big bearing surface—**with tread links 24 inches wide, that give an effective bearing surface of 40 square feet. On this mounting, a one-yard shovel has only half again as much ground pressure per square inch as the average man; and each tread belt has 7 points of roller support.



## The ideal mounting for Shovel, Crane or Dragline—

It is absolutely simple—stronger and more reliable—non-clogging—and has the *complete* steering control that permits sharp turns as well as gradual turns.

This mounting will make your shovel or crane a more productive and more profitable investment. All Gas+Air BUCYRUS-ERIES are being furnished with this new mounting as standard equipment. Many of these have seen months of field service, and are giving splendid results.

**BUCYRUS-ERIE COMPANY**

South Milwaukee, Wis.  
Erie, Pa.  
Evansville, Ind.



Branch Offices and  
Representatives  
Everywhere

## INSLEY MAST HOIST • CONCRETE PLACING MATERIAL HANDLING • EQUIPMENT

This plant is one from the Fort Lewis job which was moved to Oregon City, Ore., where it poured concrete in one half the job while the building on the other half was being demolished.

### Five for A. Guthrie & Co.

THEY bought their first INSLEY MAST HOIST for a railroad job in Illinois in April, 1926, their second for a railroad job in Ohio in November, 1926. Then they bought three for a barracks job in Fort Lewis, Washington, in May, 1927.

Unless the first Mast Hoist had made good, they would never have bought the second, nor yet the fifth. What more convincing proof could there be of the merit of INSLEY MAST HOIST equipment than the fact that a firm of the unquestioned standing of A. Guthrie and Company *bought five such plants?*

They are one of the many of the nation's leading builders who find unexcelled value in the Insley Mast Hoist.

## INSLEY Manufacturing Company

Engineers and Manufacturers  
Indianapolis

602



# *The Last word in a* **PULL-SHOVEL** *small* **and SKIMMER**



**T**HE same high quality of design and construction characteristic of all Northwest machines. All high speed shafts mounted on self aligning ball bearings.

Engine drive through helical gears running in oil and mounted on ball and roller bearings.

"Feather-touch" control makes operation easy.

Bases are cast steel.

Boom has no kinks and is a *real* box section, no openings or slots.

Maintains full traction while turning as well as while going straight ahead.

Has the same digging features as the large Northwest pull-shovels.

Convertible to a full circle skimmer scoop in six simple operations.

The same boom and dipper serves for both pull-shovel and skimmer.

Adjustable shear leg allows cutting to different depths with a level boom.

Throat of dipper is open for materials.

Skimmer dipper cuts out beyond boom point.

Skimmer digs off corner of crawlers.

Full circle swing permits a digging radius equalled by no other machine of this type.

What other pull-shovel Skimmer scoop can offer you as much?

## Northwest Engineering Co.

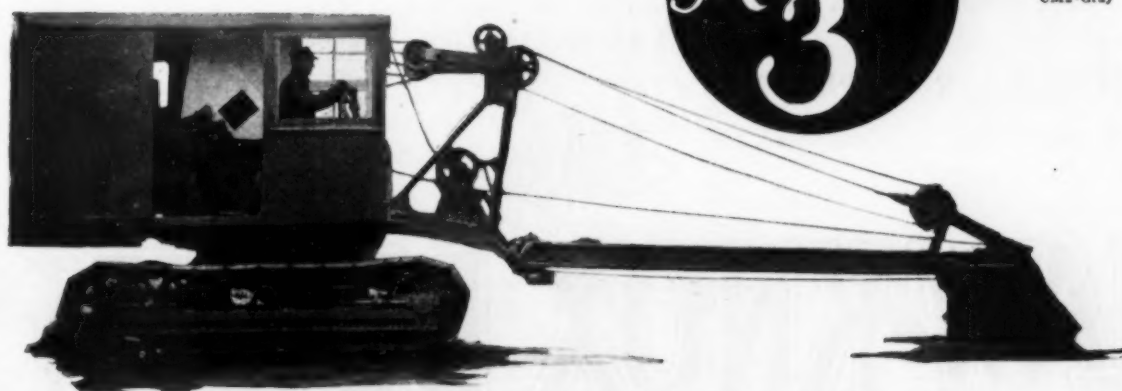
*The world's largest exclusive builders of gasoline, electric and Diesel powered shovels, cranes and draglines.*

1723 Steger Bldg., 28 E. Jackson Blvd.  
Chicago, Ill., U. S. A.

*Model*  
**3**

*Model*  
**2**

CM2-Gray



**NORTHWEST**  
CRANES-SHOVELS CONVERTIBLE and DRAGLINES



**AGAIN~  
BLAW-KNOX  
LEADS!**

**FOR  
LONGER LIFE  
AND  
ADDED POWER**

Once again Blaw-Knox has made an outstanding improvement in Bucket design. The lever arm sheaves of Dreadnaught Buckets up to one yard size now turn on BALL BEARINGS—reducing friction losses to the minimum and increasing digging power to the maximum.

Check these other vital improvements, first introduced by Blaw-Knox, which add to longer life and superior Bucket performance: 1—All moving parts bushed. 2—All moving parts lubricated. 3—All pins and guide rollers of hardened steel. 4—Elimination of "S" bends in closing cable in lever arm Buckets.

And now Ball Bearing Sheaves—sealed to keep grease in, to keep sand and grit out.



*Behind Every Blaw-Knox Bucket Stands the Company Name and Reputation for Fair Dealing—  
An Assurance of Satisfaction Far Better Than Any Trick Guarantee Ever Printed*

**BLAW-KNOX COMPANY  
FARMERS BANK BUILDING  
PITTSBURGH, PA.**

**OFFICES OR REPRESENTATIVES IN ALL PRINCIPAL CITIES**



**BLAW-KNOX BUCKETS**

# **Practical Information** on the **Use and Care** of **Wire Rope**



A Booklet Written for  
Those Who Want  
Better Results from  
The Wire Rope  
They Use

## **Your Copy is Ready**

If you are interested in getting the very best results from your wire rope—regardless of what make of wire rope you use—write us for a complimentary copy of this booklet.

Our revised edition of "Practical Information On the Use and Care of Wire Rope" contains many illustrations, among which are illustrations showing:

- How to uncoil wire rope.
- How to unreel wire rope.
- How to splice wire rope.
- How to bind ends of wire rope.
- How to attach sockets.
- How to attach clips.

If you are having any wire rope problems that are hard to solve, why not let our experienced engineering force help you? Tell us your wire rope troubles, and we shall be glad to give you our recommendation without any obligation on your part.

ESTABLISHED 1857

**A. Leschen & Sons Rope Co.**  
5909 Kennerly Ave.  
ST. LOUIS, MO.

New York.....90 West Street  
Chicago.....810 W. Washington Blvd.  
Denver.....1554 Wazee Street  
San Francisco.....Monadnock Bldg.

Published by the Makers of

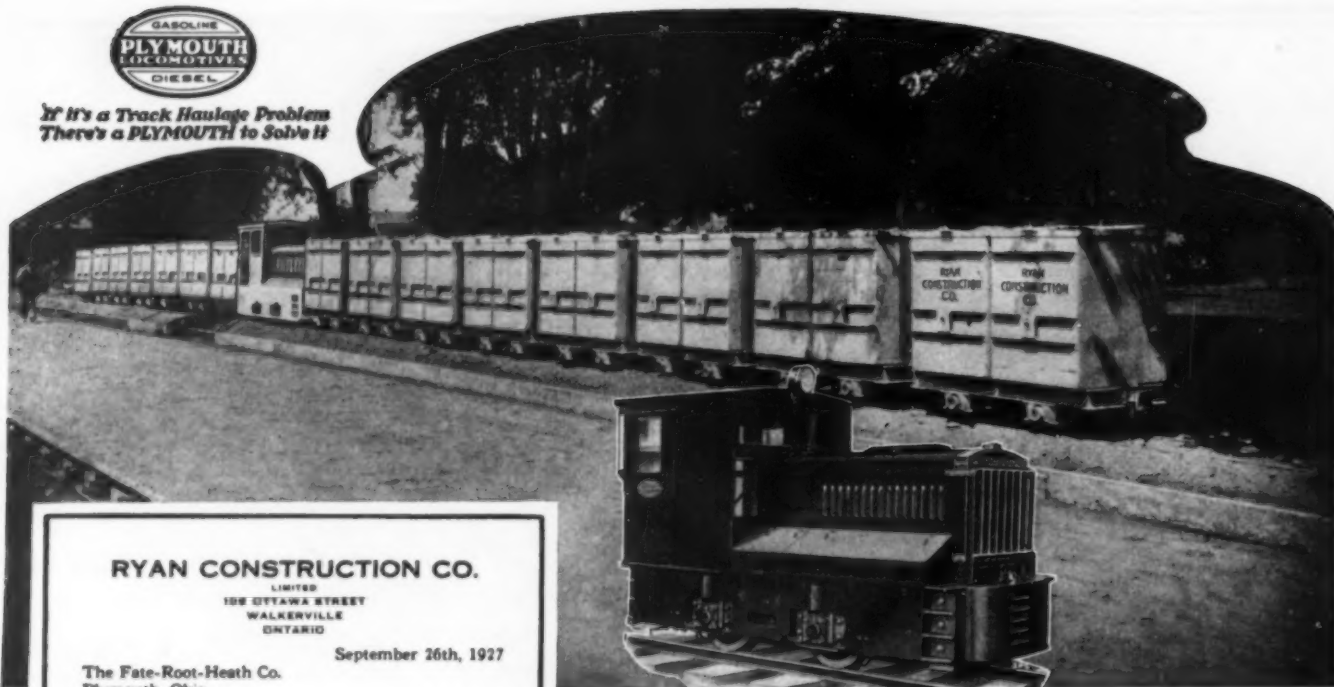
# **"Hercules" (Red Strand) Wire Rope**

Reg. U.S.Pat.Off.





If It's a Track Haulage Problem  
There's a PLYMOUTH to Solve It



## RYAN CONSTRUCTION CO.

LIMITED  
106 OTTAWA STREET  
WALKERVILLE  
ONTARIO

September 26th, 1927

The Fate-Root-Heath Co.  
Plymouth, Ohio.

Dear Sir:-

We have just completed a ten mile concrete paving job for the Ontario Government on which we used four of your eight ton locomotives.

These locomotives gave us wonderful satisfaction and we are proud to say that at no time was our mixer held up for lack of material. We used forty-eight foot boxes and loaded them to capacity at all times and our trains varied from fifteen to twenty cars, according to the length of our haul. The maximum haul from the batcher plant was 7.1 miles over undulating country.

We thought you might be interested in this information and also so far as we know this is the first highway job in Ontario where the Industrial Railway system has been used.

Yours very truly,

RYAN CONSTRUCTION COMPANY LIMITED

*J. H. Woodliff*

Vice President.

PLYMOUTH'S  
*First*  
ON

ONTARIO HIGHWAY CONSTRUCTION



### THE PLYMOUTH 10-TON DIESEL LOCOMOTIVE

A full range of sizes—from 10 to 50 tons. Fuel oil in many territories has proven its economical advantage. Wherever fuel oil is available, Plymouth Diesel Locomotives will effect a saving in fuel cost even greater in proportion than Plymouth Gasoline Locomotives have made over other methods of haulage.

# FOUR PLYMOUTH GASOLINE LOCOMOTIVES

## ON FIRST HIGHWAY JOB IN ONTARIO USING INDUSTRIAL RAILWAY HAULAGE ~

In adopting rail haulage and Plymouth power for the construction of a ten mile concrete paving job for the Ontario Government, the Ryan Construction Company have pioneered the "insurance against wet weather losses" method of delivering materials, in Ontario. This method has gained much favor and assured figured profits for an ever increasing number of contractors in the States during the past five years.

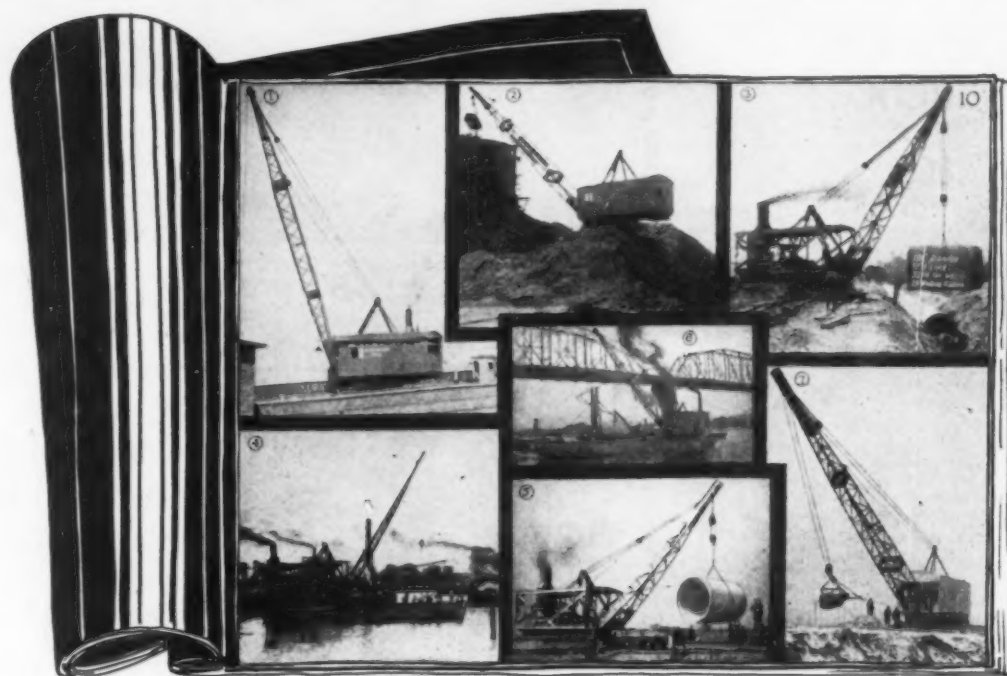
"The chance taker loses" — To gamble on a dry season is risking your estimated profit and even chancing a loss. To be able to say when the job is done — "At no time was our mixer held up for lack of material", means not only satisfaction to all concerned but coming out on the right side of the ledger.

Rail haulage with Plymouth Gasoline Locomotives is truly a "Business interruption insurance" you should never overlook.

PLYMOUTH LOCOMOTIVE WORKS  
The Fate-Root-Heath Company  
PLYMOUTH, OHIO

PLYMOUTH  
GASOLINE Locomotives DIESEL

# A new idea in presenting the **WILEY-WHIRLEY** on the firing-line



The minute you see the pictures and diagrams shown in this unique pictorial catalog, you will be astonished at the remarkable job the Wiley-Whirley is doing and in its broad application on construction work. There, you will say, is a piece of equipment that presents a wholly new idea in modern construction.

It is not a new product, nor an over-night production. We have been building Wiley-Whirleys since 1919 and they are operating now in practically all parts of the country.

That is why we are able, in this catalog, to take you with us on an extensive inspection trip that you may profit by the experience of others. For after all, seeing is believing. And we believe that in this pictorial presentation you will see some most unusual jobs handled by one of the most remarkable machines on the market, quality, versatility and price considered.

There are many reasons shown in our catalog (in pictures) why owners and operators of Wiley-Whirleys consider it the most outstanding piece of construction equipment developed in years. But, back of all that, is its strength, speed, simplicity and accessibility, and you know what that means on a construction job—*continuous operation and no expense for replacement parts.*

We want you to have a copy of this most unusual catalog presenting the Wiley-Whirley on the firing-line. By necessity, the edition is limited, so we would suggest that whatever else you do today, you take the few minutes necessary to fill out and mail the coupon which we have attached for your convenience. Then you will say that here is a machine that can't be beat on clam-shell, dragline, crane or derrick work.

## THE DAYTON-WHIRLEY CO., DAYTON, OHIO, U. S. A.

COUPON

COUPON

THE DAYTON-WHIRLEY CO.

Dayton, Ohio

Please send your new, unique catalog to:

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# REMEMBER—Way back when

Grading was done with a couple of planks, 4 mules, 1 horse and a world of patience?

1866



## Then we got good!



Under an ordinary farm wagon we hooked a blade — 2 husky boys bore down on it by means of levers attached to the platform. The bigger the men — the better the grader.

1879

## NOW

Telescopic Axles    Leaning Wheels  
Arched Steel Frames  
(HOT RIVETED)  
Compensating Springs  
Ease for the Operator

Alemite Lubrication  
Back Sloper  
That's the  
1928 Grader!



**THE AUSTIN-WESTERN**  
**ROAD-MACHINERY CO. Chicago**  
400 North Michigan Avenue





*Carlton Bridge*

*State of Maine.*

*Bath, Maine*

*Maine Central Railroad Company.*

*Pier Construction by The Foundation Company.*

Once more a record has been achieved by The Foundation Company, during the construction of the piers for the Carlton Bridge at Bath, Maine. The bridge is a double deck structure, built for the State of Maine and the Maine Central Railroad. In the construction of the piers by the pneumatic caisson method, a record depth in American waters of over 123 feet was reached.

## THE FOUNDATION COMPANY CITY OF NEW YORK

*Office Buildings  
Industrial Plants  
Warehouses  
Railroads and Terminals  
Foundations and Underpinning  
Filtration and Sewage Plants*

ATLANTA  
PITTSBURGH  
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*Hydro-Electric Developments  
Power Houses  
Highways  
Rivers and Harbor Developments  
Bridges and Bridge Piers  
Mine Shafts and Tunnels*

**BUILDERS OF SUPERSTRUCTURES AS WELL AS SUBSTRUCTURES**





# The New CLETRAC Complete-Line Catalog Is Ready for You!

**N**OW ready for distribution — the attractive new book which gives you full information on the complete line of CLETRAC CRAWLER TRACTORS for road-building, road-maintenance, municipal and industrial service.

Write for your copy today. Find out about the full range of sizes now available. Get the complete, up-to-the-minute facts regarding these record-making crawler tractors of advanced design and highest-quality construction.

MAIL THE COUPON!

**The Cleveland Tractor Co.**  
Cleveland, Ohio

THE CLEVELAND TRACTOR CO.,  
Cleveland, Ohio

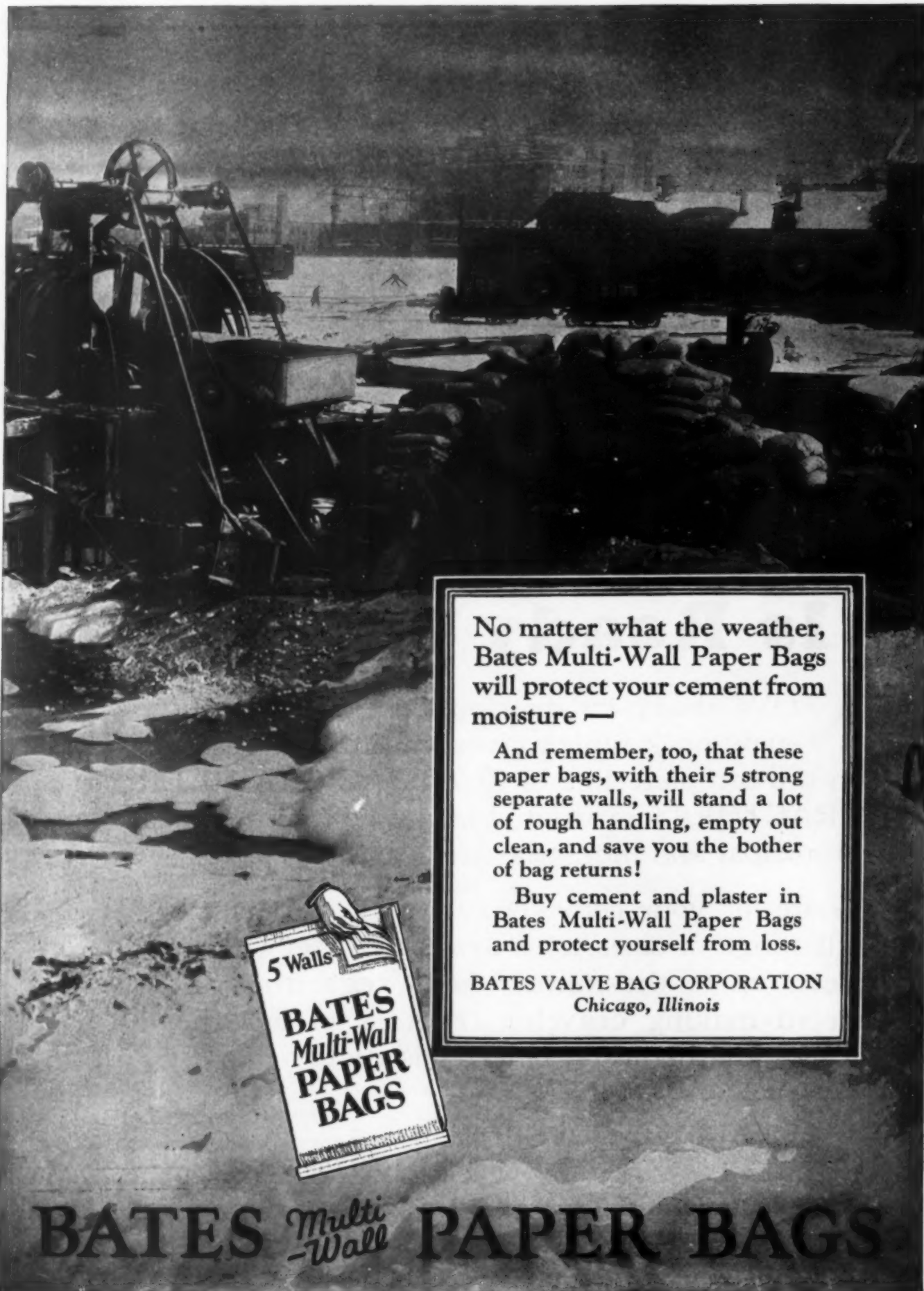
Mail the New Cletrac Road Catalog  
at once to

Address \_\_\_\_\_

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C.M. \_\_\_\_\_





No matter what the weather,  
Bates Multi-Wall Paper Bags  
will protect your cement from  
moisture —

And remember, too, that these  
paper bags, with their 5 strong  
separate walls, will stand a lot  
of rough handling, empty out  
clean, and save you the bother  
of bag returns!

Buy cement and plaster in  
Bates Multi-Wall Paper Bags  
and protect yourself from loss.

**BATES VALVE BAG CORPORATION**  
Chicago, Illinois

5 Walls  
**BATES**  
Multi-Wall  
**PAPER**  
**BAGS**

**BATES** *Multi-Wall* **PAPER BAGS**

Building caissons, 40 feet deep through quicksand, for a 24-floor apartment, W. J. Newman & Co., Foundation Contractors, protected themselves from loss in bad weather by buying all cement for the job in Bates Multi-Wall Paper Bags



*In use since 1908*  
**- still going strong!**

**A**CTUAL SERVICE is the acid test for any equipment, be it locomotive or wheelbarrow. It is, therefore, with pardonable pride that we point to two Milwaukee Gasoline Locomotives that have been in use constantly since 1908 and 1910 in the service of the Hobart Estate Company, Hobart Mills, California — and that are still going strong! One of these pioneer gasoline locomotives is shown in the picture at the top of this page.

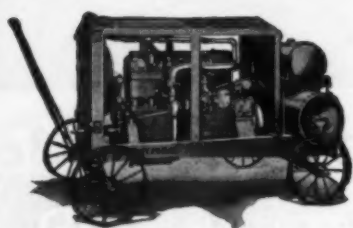
But just as the automobile of nineteen years ago was a crude product when compared with the finished perfection of 1927 models, so also was the Milwaukee Gasoline Locomotive of 1908 a crude affair when compared with the trim, husky powered, four-speed Milwaukee Gasoline Locomotives of today. We have been building gasoline locomotives since 1907. Milwaukee Gasoline Locomotives are made in all sizes, for any gauge track.

# MILWAUKEE

*Gasoline*

## Locomotives

MILWAUKEE LOCOMOTIVE MFG. COMPANY  
 Subsidiary of National Brake & Electric Co.  
 MILWAUKEE, WISCONSIN



Get acquainted with National Air Compressors — the latest and greatest improvement made in gasoline engine driven portable units — the climax of thirty-one years' designing and engineering development. Engine and Compressor are a compact unit mounted on one crankcase and operated by one crankshaft.

SIZES: 110, 160, 240 and 330  
 Cubic Feet, standard mountings.

NATIONAL BRAKE & ELECTRIC CO.  
 Division of Westinghouse Air Brake Co.  
 MILWAUKEE, WIS.

*National*  
 AIR COMPRESSORS  
 ANOTHER  
 WESTINGHOUSE  
 PRODUCT

Exclusive Territorial Sales  
 Franchises Available.



# ROCK DRILLS

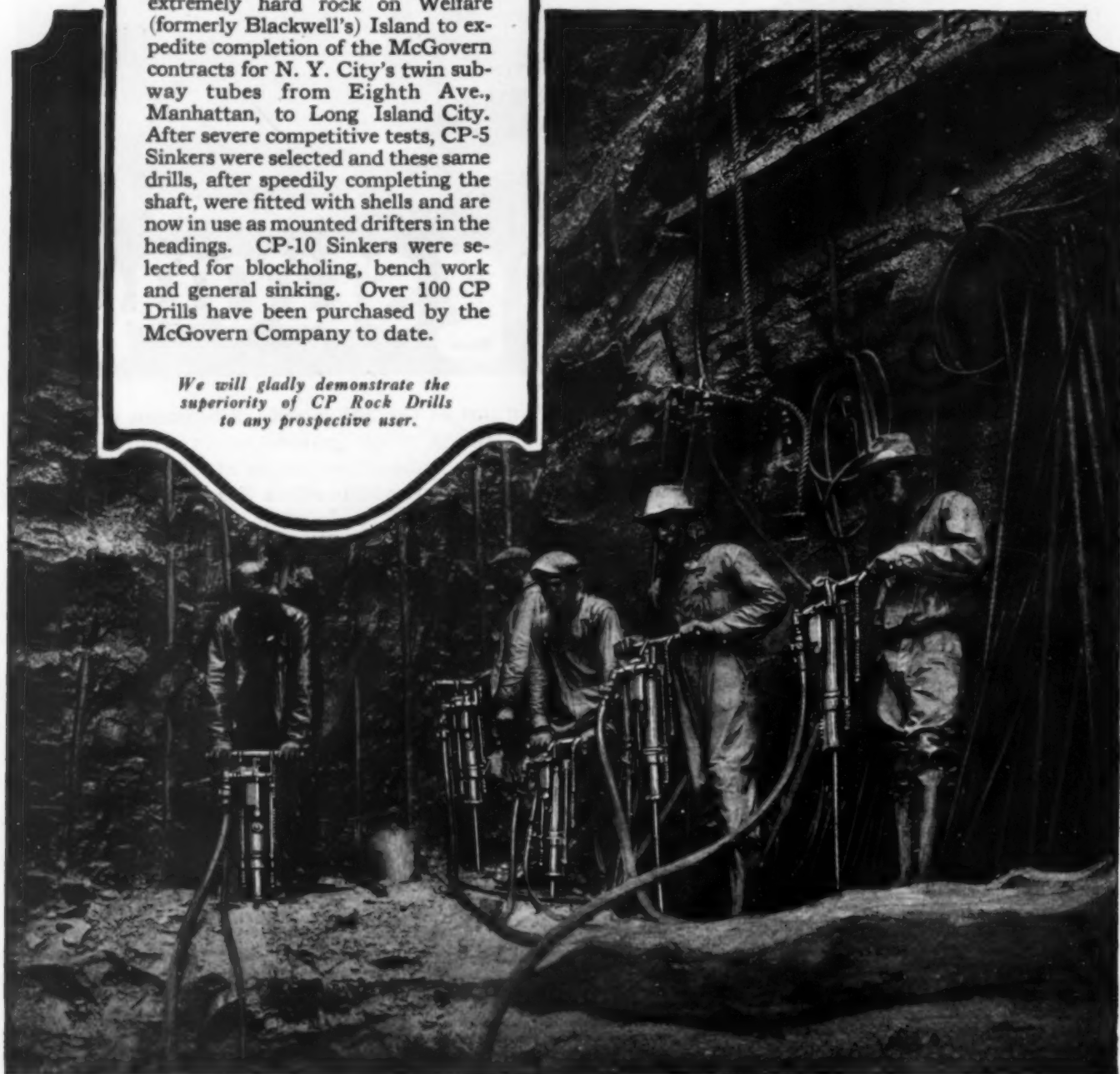
*selected by*

PATRICK

McGOVERN, Inc.

The 31 ft. 6 in. shaft illustrated was sunk to a depth of 96 ft. through extremely hard rock on Welfare (formerly Blackwell's) Island to expedite completion of the McGovern contracts for N. Y. City's twin subway tubes from Eighth Ave., Manhattan, to Long Island City. After severe competitive tests, CP-5 Sinkers were selected and these same drills, after speedily completing the shaft, were fitted with shells and are now in use as mounted drifters in the headings. CP-10 Sinkers were selected for blockholing, bench work and general sinking. Over 100 CP Drills have been purchased by the McGovern Company to date.

*We will gladly demonstrate the superiority of CP Rock Drills to any prospective user.*



**Chicago Pneumatic Tool Co.**

*Sales and Service Branches all over the world*

6 East 44th Street, New York, N. Y.







### Automatic Skip Shaker (Patented)

Stops that man from pounding your skip out of shape. More batches a day with this exclusive JAEGER feature. Only skip vibrates. Simple! Troubleproof!



## JAEGER'S TIMKEN BEARING FULL ONE BAG TILTER

—at the usual half bag price!

DEPENDABILITY, that's why Jaeger is the world's largest selling line of mixers—We try to eliminate break downs by using steel and forgings—semi-steel gears—Timken bearings—saving weight yet 50% stronger.

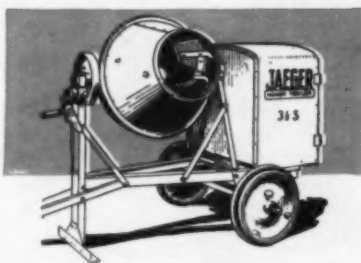
SPEED, Jaeger Patd. "Flat Spot" Drum discharges batch clean in 5 seconds—mixes better—easy automatic discharge—fast accurate measure water tank—automatic skip shaker. Get more batches a day with Jaegers.

### THE JAEGER MACHINE COMPANY

800 Dublin Avenue

COLUMBUS, OHIO

Over 100 Jaeger service stations, distributors and branches are located in all principal cities—no delays—standardize on Jaeger and profit by our quick service.



**\$179.50**  
NET  
F.O.B.  
Factory

buys the Handy Trailer—full half bag size—complete with engine.

### HEAVY DUTY NON TILT MIXERS

7-10-14-21-28 ft. sizes  
Ask about 7-S Speed King for \$200 less.

*Mail this Slip Today  
for Prices  
and  
Convenient  
Terms*

THE JAEGER MACHINE CO., Columbus, Ohio  
800 Dublin Avenue  
Please send catalog, prices and terms on  
☐ NON-TILT MIXERS ☐ PLASTER MIXER ☐ TILTING MIXERS  
Name \_\_\_\_\_ Date \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

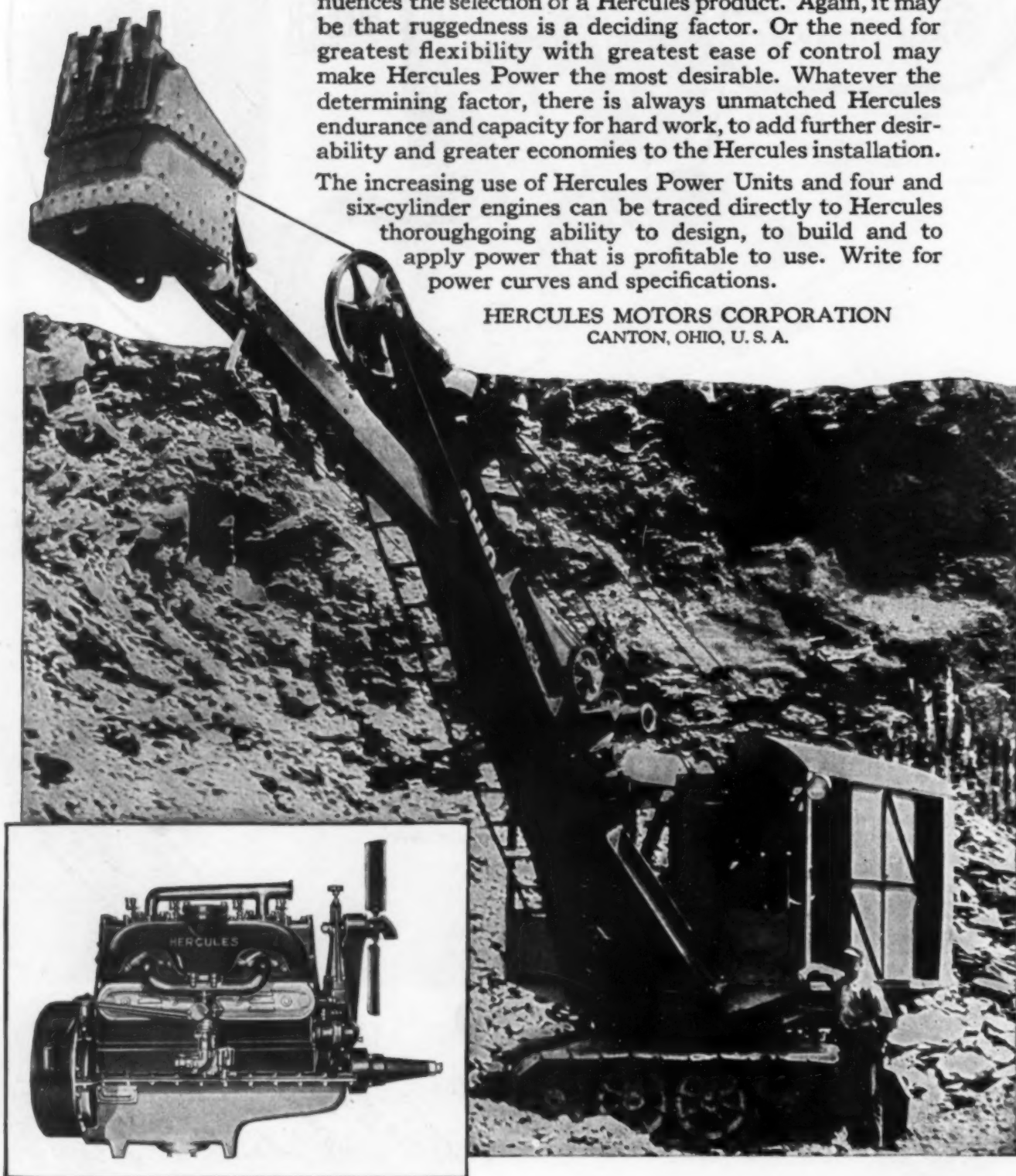
# Hercules

## and the Ohio Power Shovel

Sometimes it is the need for utmost compactness that influences the selection of a Hercules product. Again, it may be that ruggedness is a deciding factor. Or the need for greatest flexibility with greatest ease of control may make Hercules Power the most desirable. Whatever the determining factor, there is always unmatched Hercules endurance and capacity for hard work, to add further desirability and greater economies to the Hercules installation.

The increasing use of Hercules Power Units and four and six-cylinder engines can be traced directly to Hercules thoroughgoing ability to design, to build and to apply power that is profitable to use. Write for power curves and specifications.

HERCULES MOTORS CORPORATION  
CANTON, OHIO, U. S. A.

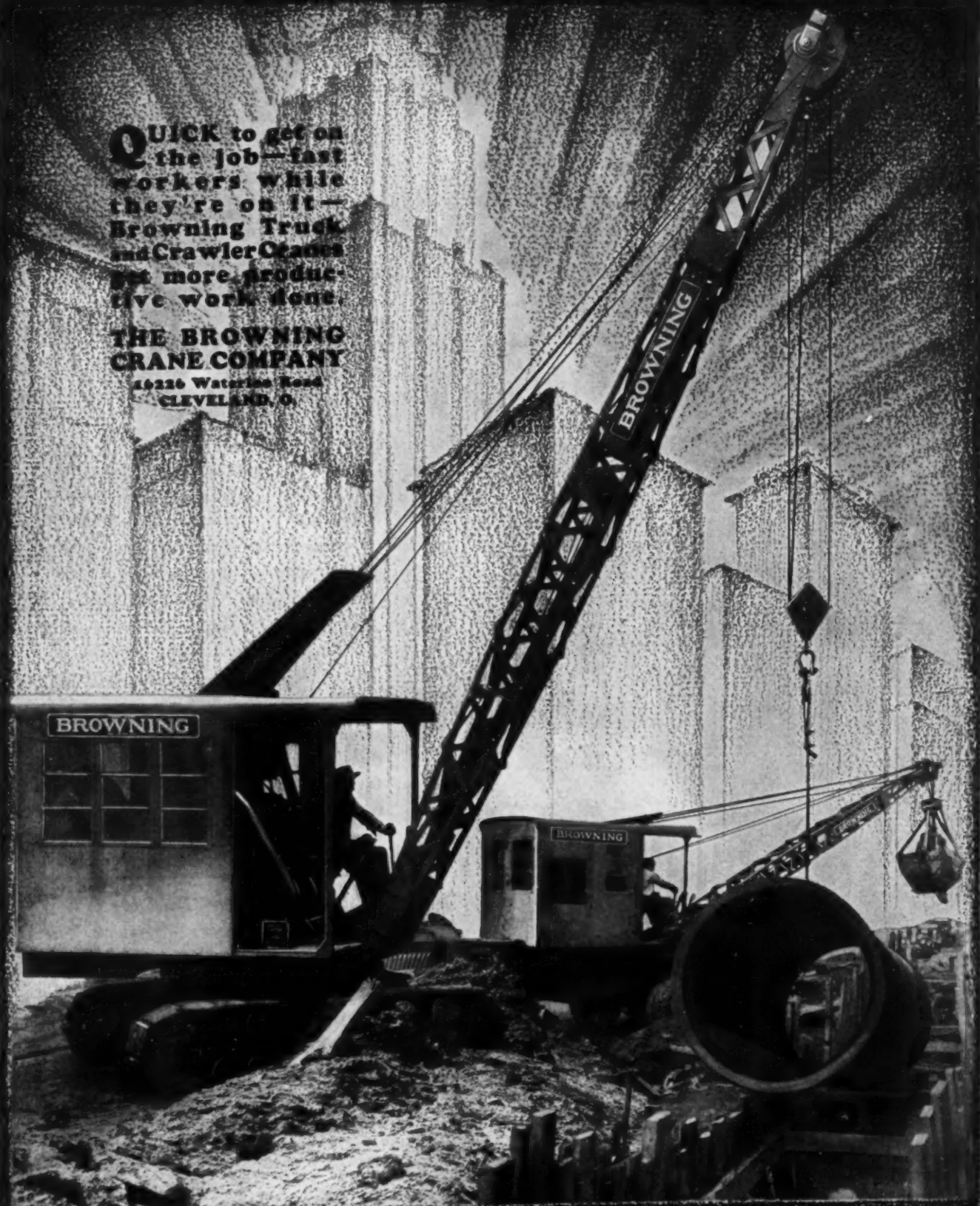




**Q**UICK to get on  
the job—fast  
workers while  
they're on it—  
Browning Truck  
and Crawler Cranes  
get more produc-  
tive work done.

**THE BROWNING  
CRANE COMPANY**

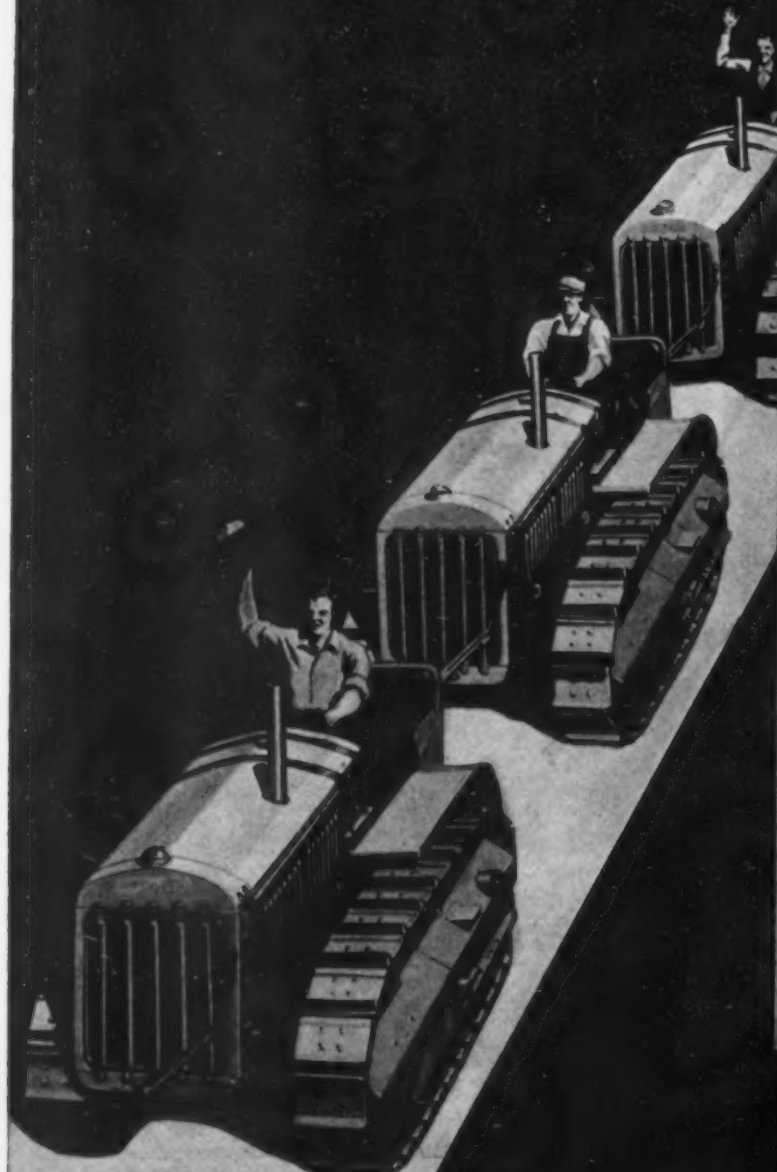
16226 Waterloo Road  
CLEVELAND, O.



**BROWNING CRANES**  
**LOCOMOTIVE, TRUCK & CRAWLER**  
**STEAM · GASOLINE AND ELECTRIC**



# NOW comes the "CATERPILLAR" TWENTY TRACTOR



## NEW!

NEW...and containing every feature of "Caterpillar" sure-footedness, dependability and sturdiness...backed by the now united experience of the two pioneer builders of track-type tractors, Holt and Best.

New, too, in design...crisply up-to-date in its possession of the many refinements constantly being developed by the "Caterpillar" engineers.

And ready for new achievements in doing Better, Quicker, Cheaper work for road builders, farmers, loggers, contractors everywhere..for industries and for cities.

### "Caterpillar" Tractors

2-TON • TWENTY • THIRTY  
SIXTY

### CATERPILLAR TRACTOR CO.

Executive Offices: San Leandro, California, U. S. A.

Sales Offices and Factories:

Peoria, Illinois      San Leandro, California

Distributing Warehouse: Albany, N. Y.

New York Office: 50 Church Street

Successor to

BEST C. L. Best      The Holt Manufacturing Company      HOLT  
Tractor Co.

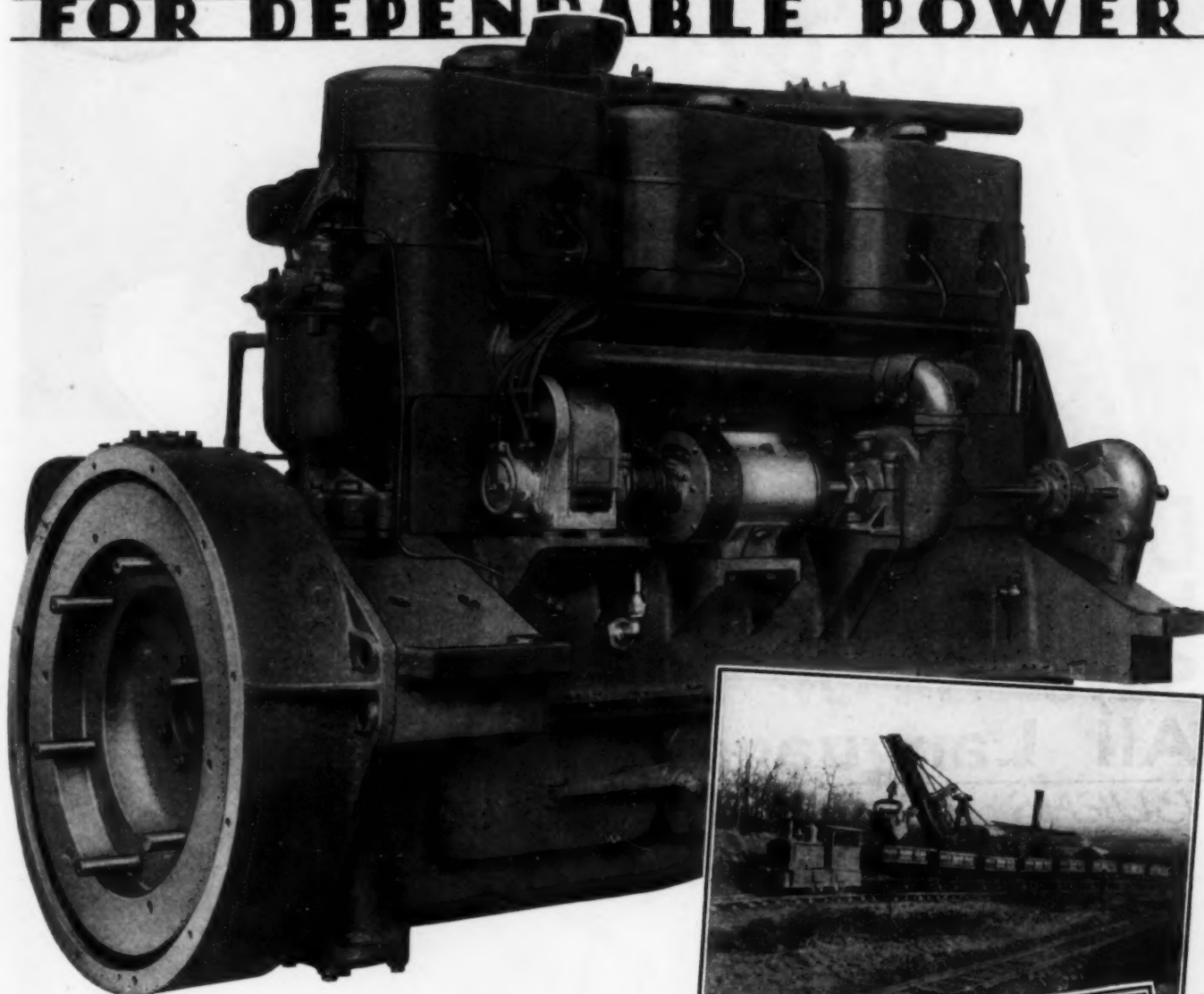
There is a "Caterpillar" Dealer  
near you.

# CATERPILLAR

REG. U.S.

PAT. OFF.

# FOR DEPENDABLE POWER



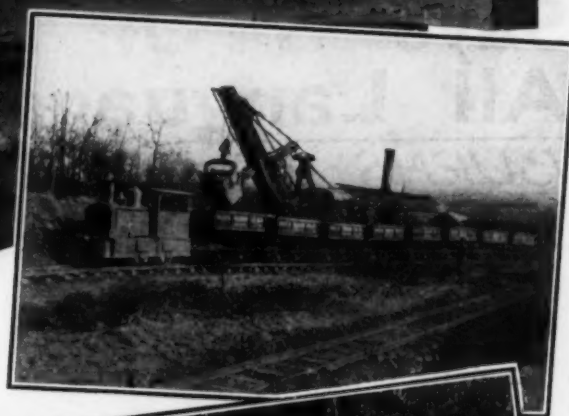
## *Keeping Things Moving*

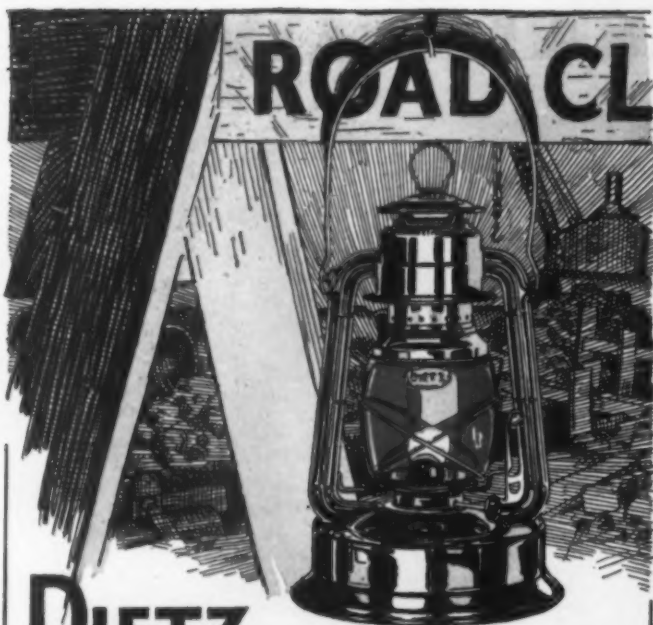
**T**HOSE HEAVY JOBS — where idle moments cost so terrifically — reflect the character of the power. There, power must be dependable to keep things moving constantly—to safeguard contractors' profits.

It all reverts back to the kind of power — the kind of engine. Le Roi Industrial Engines are exclusively used in heavy service. What testifies better to their reliable and economical power?

**LE ROI COMPANY**  
Milwaukee, Wis.

**LE ROI ENGINES**  
**3 to 160 HORSE POWER**





## DIETZ LITTLE GIANT Says "STOP" in All Languages

*BURNS 70 HOURS  
WITHOUT REFILLING*

**C**ONGESTED night traffic conditions are popularizing Contractors' Lanterns of higher candle power, as a means of avoiding accident claims.

The latest improvement in Contractors' Lanterns is Dietz "Little Giant." This Cold Blast Lantern has a very large oil fount but is only 11½ inches high. It sheds 50% more light than the older style Hot Blast Lanterns and will burn continuously for 70 hours. Hence, no servicing is required over weekends and holidays.

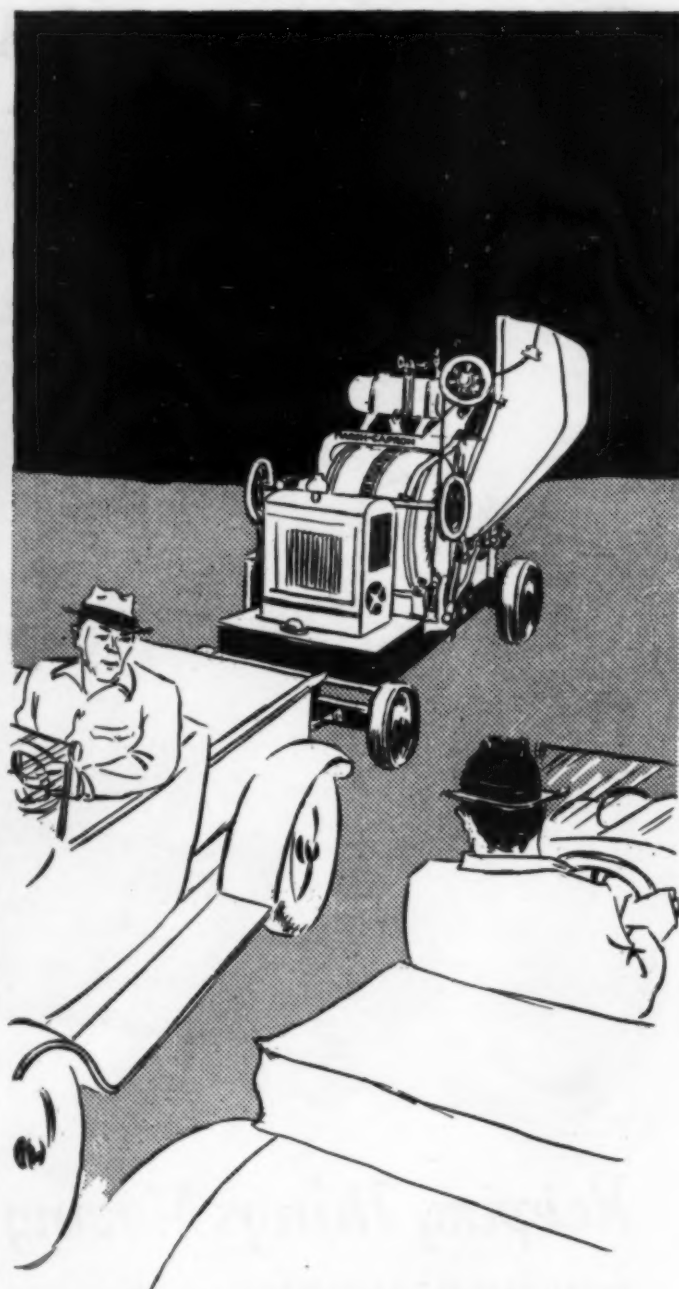
"Little Giant" Lanterns meet the price requirements of large users of Contractors' Lanterns

**R. E. DIETZ COMPANY**

NEW YORK

*Largest Makers of Lanterns in the World*

FOUNDED 1840



WHATCHA GOT THERE?  
MY NEW MARSH--  
CAPRON 10S TRAILER  
I'M GOING TO SHOW  
YOU FELLOWS SOME  
REAL SPEED THIS YEAR



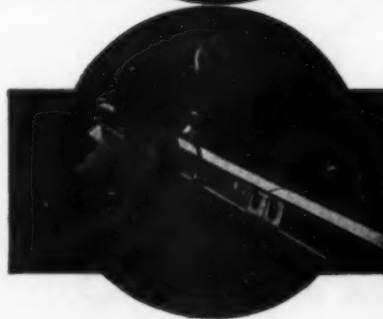
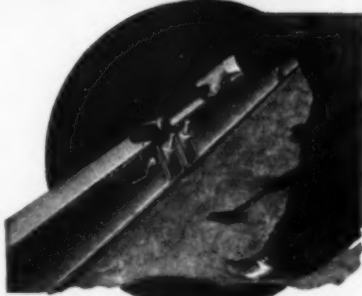
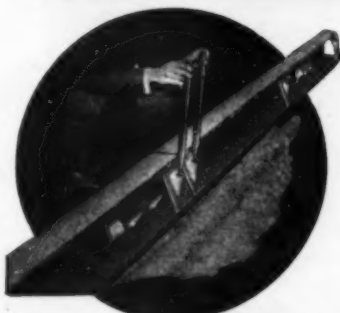
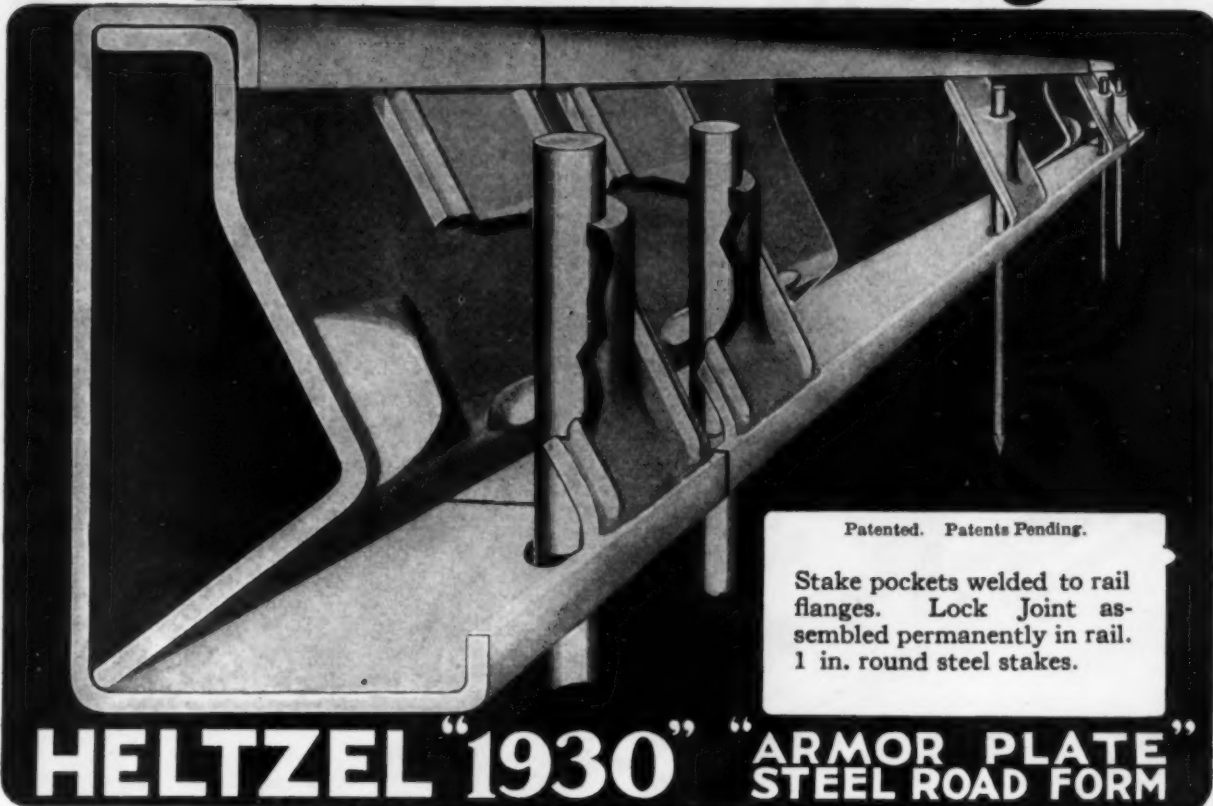
**The Marsh-Capron Co.**  
11 S. LaSalle St. • Chicago

3½S, 5S, 7S, 10S  
14S, 21S and 28S  
Tilters and non-tilters

CM1-Gray



# Super-Strength



## A New Heltzel Road Form to Meet New Requirements

Highway specifications are becoming more rigid, competition keener, and contractors' profits are less. Road Builders require better form equipment to meet demands of to-day and the future. Heltzel has placed better Steel Forms at the disposal of those contractors who desire the most efficient form equipment.

The new HELTZEL Forms were used in soft, mucky ground; they were used in sandy subsoil, and in each instance they held; they were also used on old macadam base and the 1 in. massive HELTZEL steel stakes were driven through the old macadam with a twelve pound sledge. Ordinary steel stakes,

now generally in use, would have bent like a piece of lead pipe under such conditions. See illustration below showing how HELTZEL high carbon steel stakes may be driven through a piece of  $\frac{1}{4}$  in. steel boiler plate.

There are no loose parts. When you pick up the form and the stakes, you have everything. This form is also suitable for integral curb and base and header curb construction.



Write for copy of *HELTZEL'S New Road Form Bulletin.* Showing HELTZEL 1-in. steel stake driven through  $\frac{1}{4}$ -in. boiler plate steel.

## THE HELTZEL STEEL FORM & IRON CO., WARREN, OHIO

Also manufacturers of Steel Road Forms, Steel Curb Forms, Steel Curb and Gutter Forms, Steel Sidewalk Forms, Mixing Boxes, Agrabatchers, Trailer Bins, Stationary Bins, Manhole Forms, Sewer Forms, Pipe Forms, Finishing Machines, Strikeoffs, Trall Graders, Subgrade Testers, Travelling Bridges, Car Unloaders, Steel Mortar Boxes, Steel Tool Boxes, Joint Machines.

# HELTZEL

# Along the Road to 1928 Profits!

## Whatever job you meet along

this road to 1928 profits, there is a Universal attachment to do it with the greatest speed and greatest profits:

Clamshell	Pile Driver
Dragline	Magnet
Trench Hoe	Skimmer Scoop
Shovel	Hook Block
Backfiller Board	Post Hole Drill

Choose the attachments best suited to your job. They are all interchangeable on the standard Universal Crane—that's why the Universal is not just one machine, but as many machines as types of work you want it to do. It's Universal. Also, Universals are the pioneer motor truck mounted cranes. Where else can you get this speed plus this all-purpose adaptability in rolling from job to job?

**The Universal Crane Co.**  
933 Sweetland Bldg., Cleveland, O.

# UNIVERSAL CRANES

# The easiest paver on the market to operate



*All* in a row, mounted on a high operating platform, all the same height, all pull one way just like the levers of an interlocking tower. That's the MultiFoote idea.

The operator has only to pull the lever, it goes back by itself and the controls for mixing and travel are grouped so he uses but one group at a time. Only *five* levers control the ordinary operations and the levers for auxiliary operations are within easy reach. The whole MultiFoote is at his finger tips and the fastest mixing cycle is possible.

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of Nunda, N. Y.

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Wilcox Brothers, Inc.  
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E. J. McHarg & Co.  
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*World's largest exclusive builders  
of road pavers*

**MULTIFOOTE**  
*The Paver with Broken Bearings*

MultiFoote Sales Company  
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Edward R. Bacon Company  
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We have a mighty interesting little booklet for you; send for your copy. Booklet 90.



# 1928 Can Be a more Profitable year for Building Contractors

**B**UT to make profits—you must have something besides just equipment for the job, important as that is. The extra profits, the kind that turn a small margin into a very satisfactory balance are made by the use of labor and time saving features such as only

## WANDER THE BEST TILTING MIXERS

can give you.

If you are interested in bigger profits this year, send for this big, new book, plumb full of helps and suggestions. It's absolutely free for the asking.

Construction Machinery Co.  
Waterloo, Iowa



### CONSTRUCTION MACHINERY CO.

I would certainly be glad to know how to increase my profits this year—send me your book and any other information on the following equipment that I may be interested in.

#### LOADER MODELS

☐ 3½-S ☐ 5-S ☐ 7-S

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☐ 3½-S

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448

# "It can't be done"— Here it is!

Here's a Homelite Portable Centrifugal Pump hanging on a rope and lifting water 22 feet. They said it couldn't be done. Any Homelite outfit will do as much. What's more, it will handle heads up to 50 feet. The maximum capacity of this pump is 7,500 gallons per hour.

Yet it weighs only 95 pounds complete with its 1½ H.P. air cooled engine and stows in space 2 x 1½ x 2 feet.

It's a sturdy, reliable outfit made to stand the gaff of gruelling service on any construction job. Contractors and utilities are using more and more of them. Try one.

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\$225

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Port Chester

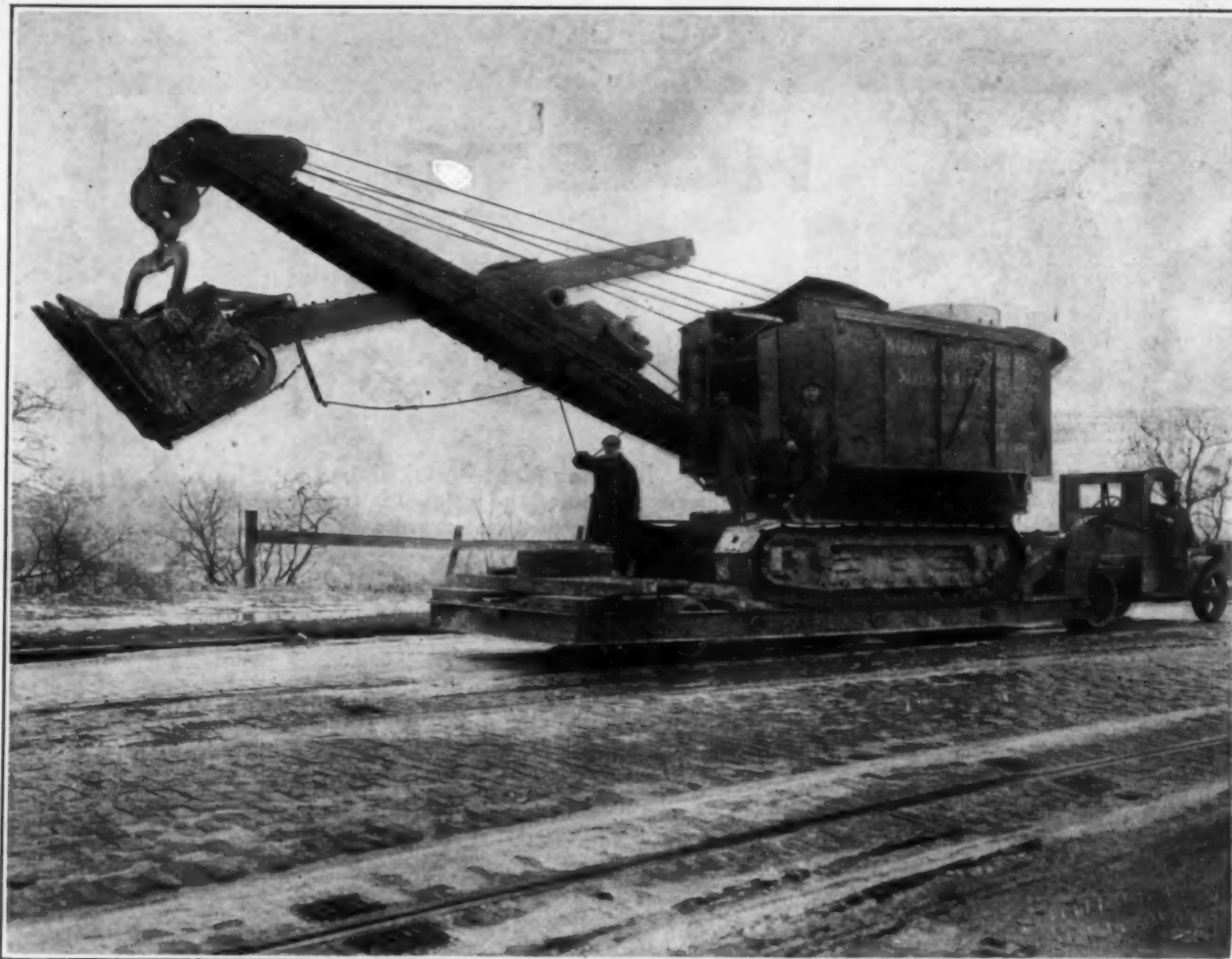
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Get one and  
you'll want more

The HOMELITE CORP., PORT CHESTER, N.Y.

# HOMELITE

Portable Centrifugal Pump



## **The ROGERS Way Cuts Transporting Costs**

The strength and dependability of Rogers Heavy Duty Trailers—the short turning radius—the rocking axles that provide safety on uneven roads—the time saving, road saving, load saving, money saving features were all explained at the wonderful Road Show recently held in Cleveland.

Now let Rogers engineers study your individual requirements and recommend equipment that will adequately and economically meet your needs.

There are four, six or eight wheel types. Capacity from one to seventy-five tons. Whatever your haulage problems we'll solve it with a Rogers Heavy Duty Trailer. Write.

# **The Rogers Brothers Corporation**

Albion

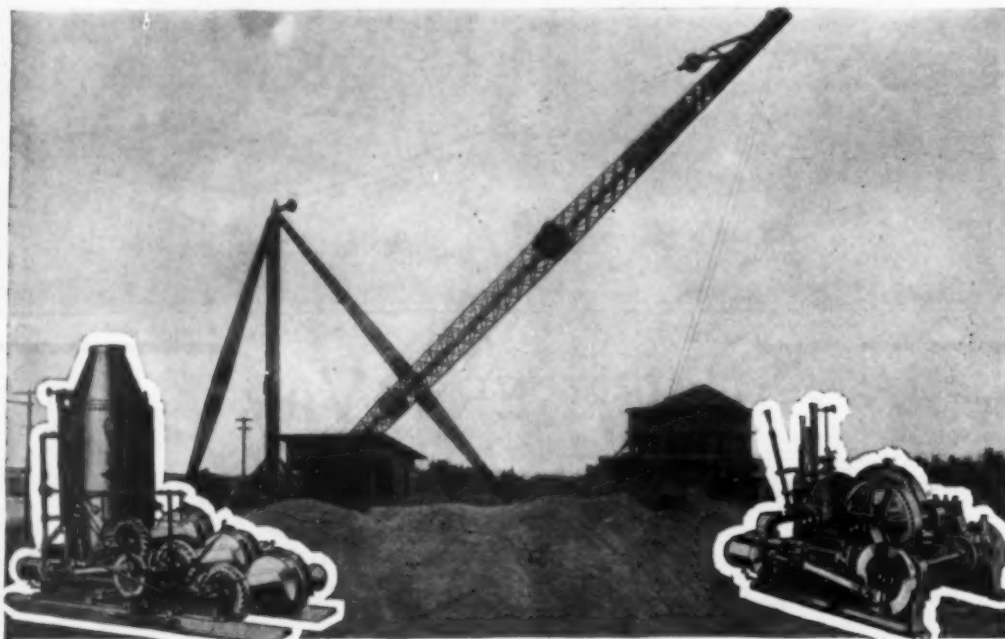
Pa.



# HOISTS CLYDE DERRICKS

Below is shown a typical material handling plant for Oklahoma road building. The Clyde seven and one-half ton derrick handles the unloading from cars to stockpile and from stockpile to hopper. The Clyde three-drum steam hoist and the Clyde swinging gear complete the equipment.

Completely equipped by Clyde has proven highly effective for many contractors. It is a practical and economical method of solving your problems.



The above equipment is owned and operated by William M. McMichael of Tulsa.

*You'll Take Pride in Your Clyde!*

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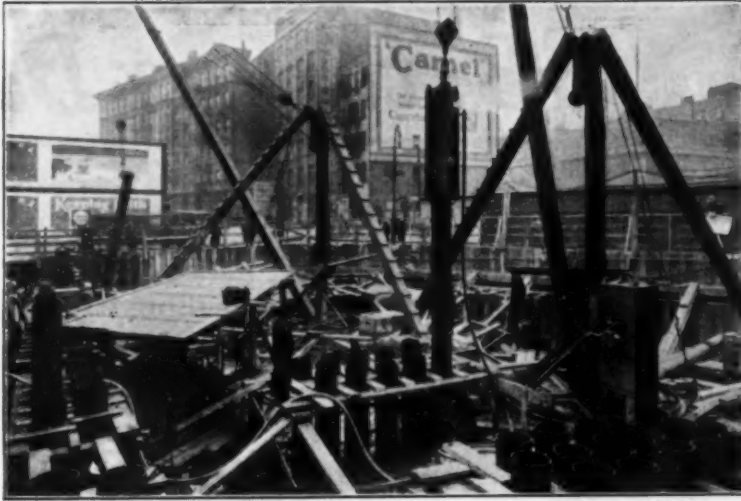
TWO MARKS OF



GUARANTEED QUALITY







30,000 feet of 60-foot cylinders driven in one week by three McKiernan-Terry Pile Hammers, through fill and an old peat bog. One No. 7, two 9-B-2. Used by the Underpinning & Foundation Co., New York, on a new service station for the N. Y. Edison Co. Architect, W. W. Whitehill; Engineer, E. M. VanNorden; Contractors, Wm. F. Kenny Co.

Of all the double-acting pile hammers used throughout the world, 5 out of 7 are made by McKiernan-Terry.

# McKiernan-Terry PILE HAMMERS

**McKIERNAN-TERRY DRILL COMPANY**  
21 Park Row, New York

Pile Hammers for heavier concrete sheet and bearing piles, submarine pile driving, timber and pipe piles, heavy steel cylinders, batter piling, heaviest and lightest steel and wood sheeting, pile pulling, and demolition. Ten sizes, from 95 to 13,185 pounds.

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To McKiernan-Terry Drill Co.,  
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☐ Send your 100-page book of pile driving job pictures.

☐ Send your local representative.

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*and more*



AT EVERY BITE  
*Bites per Day*



"A bigger day's work than any other bucket of the same weight and capacity"... here's a guarantee that means something if you are trying to find a way to cut costs. And you can add "longer life and no breakage"... or write your own guarantee.

Watch an Owen on the job... ask the operator... look into the time and labor records. You'll be convinced that the Owen Guarantee holds!

There are 17 Good Reasons Why you ought to know. Send for them.

**THE OWEN BUCKET COMPANY**  
6023 BREAKWATER AVENUE  
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# Owen Buckets

# To Look At Profit

## *Look At This Great 1-Bag Rex*

Concrete mixers cannot be called mere mixers any more. They are highly specialized production units. Upon them depends how much concrete is poured—how soon it is poured—and what it costs to pour.

On these grounds we say, "To look at profit, look at this great 1-bag Rex 7-S." It is built for continuous high-speed production of good concrete. It is built to maintain that production season after season.

Its skip goes up faster, in 7 short seconds. Big mixing blades pull the aggregates through the big intake opening faster. Oversize mixing buckets, plus a wide, long discharge chute and a big discharge opening, clean the drum of its batch in record-breaking time.

With this money-making performance is the close-coupled construction, augmented this year by a newly designed front axle and Timken Bearings.

# REX MIXERS

Reg. U. S. Pat. Off.

## MORE YARDS PER DAY

IMPROVED AGAIN FOR 1928



### Send for Catalog on this great Rex 7-S

Compare any other one-bag mixer with it—on any point. 7-second skip—7-second discharge—size of drum openings—Timken Bearings in pressed steel drum rollers—2-cylinder, 8 h.p. Le Roi automotive type engine—twin disc automotive type clutch—opposite side discharge control—stronger front axle—unusually compact—Chabelco all steel Chain Drives—Automatic skip clutch knockout and brake—handles a full one-bag batch on any standard mix.

Tear the coupon and send for catalog

Chain Belt Company,  
764 Park St., Milwaukee

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Address.....

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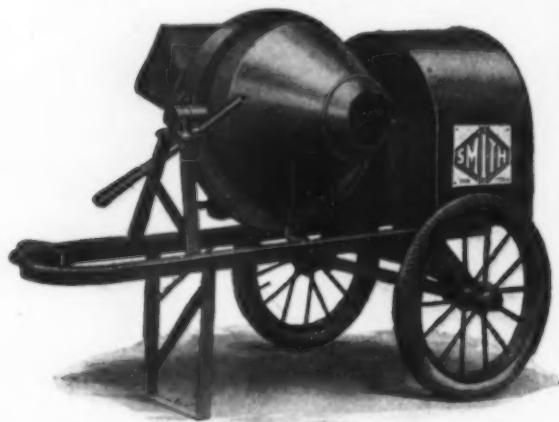
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# Now—at New Low Price

## The Smith Mascot—2½-S

Built on the same principles as the larger Smith Mixers used on the country's biggest projects



*Smith Mascot—the finest 2½-S Mixer ever produced and now at a price you cannot afford to overlook.*

**T**HERE has been no cheapening of the Mascot—instead, there are refinements that make it better than ever. Bigger production, due to widespread recognition of Smith quality, has made possible this reduction in price.

The small contractor no longer must sacrifice Smith materials, design and construction for the saving on first cost. It never was good economy to buy a mixer of inferior design; a Smith, with its long life, well-known dependability, and features that are the result of 28 years' experience, was always the "better buy." Yet many contractors, perhaps because of lack of capital have bought small mixers that could not give them the advantages of the famous Smith Tilting Drum.

The Mascot has the same speed of mixing and discharge as the big Smiths, discharge operated from either side, all steel frame with trussed rear axle. See the Smith dealer near you or mail the coupon for the Smith catalog giving full dimensions, prices and specifications.

**The T. L. SMITH COMPANY**

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*The price on the Smith 3½-S Tilter has also been reduced. Half-bag capacity; with or without power loader.*

*Sales Offices and Service Stations in All Principal Cities*

**Prices Reduced  
on Other Small  
Size Smith  
Mixers Also**

*Smith Tilting Mixers: 2½, 3½, 5, 7, 10, 14, 21, 28, 40, 56 and 112 cu.ft. per batch. Non-Tilters: 5, 7, 10, 14, 21 and 28 cu.ft. per batch.*

# SMITH MIXERS



## **BAKER MANEY** Self Loading Scrapers

**"The Original Self Loading Scrapers"**

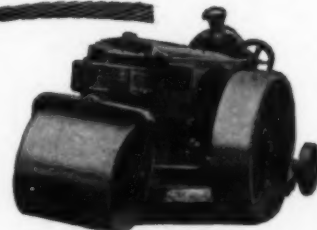
Automatic dirt moving, the "Baker Maney way," gives you the yardage you want without a big investment in labor and supervision. Cut your grading gang down to two and three men without decreasing your yardage. Baker Maney's are made strong enough for the heaviest tractors built. Two sizes, Model H, ¾-yd., and Model D, 1¼-yd. capacities.

*Send for 32-page Baker Maney Catalog.*

**The Baker Manufacturing Co.**

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## *Reputation*

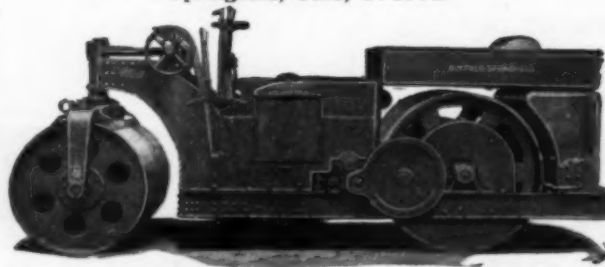


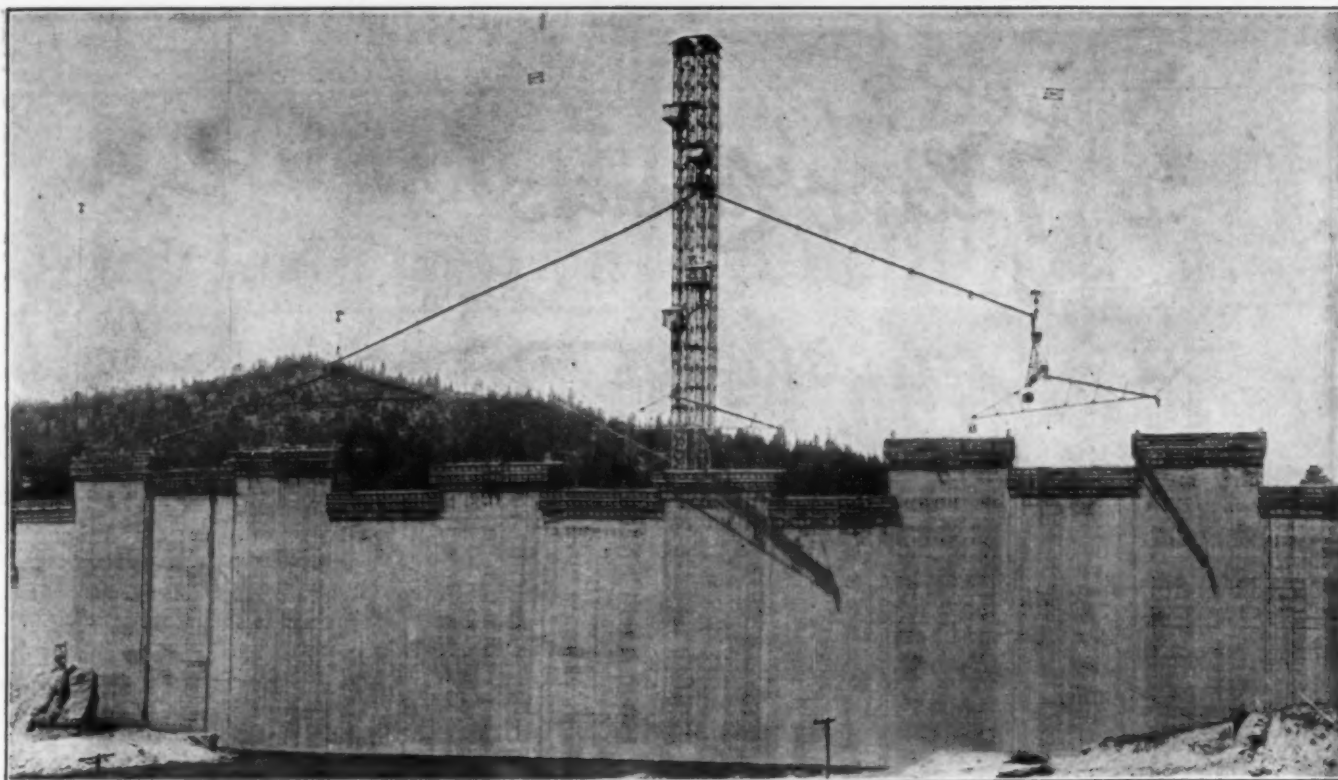
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Latest types and all practical sizes. Scarifiers and other attachments when specified.

*Illustrated literature ready to mail. Write us.*

**The Buffalo-Springfield Roller Co.**  
Springfield, Ohio, U. S. A.





*The Lakewood Double Compartment Steel Tower as shown above was 360 ft. high and each compartment handled a 2½ cu. yd. Elevator Bucket.*

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**T**HE Construction Division of the Southern California Edison Co. placed 280,000 cu. yds. of concrete in the Shaver Lake Dam in 271 days with Lakewood Chuting and Steel Tower Equipment. The maximum run for an eleven-hour shift was 4808 cu. yds.

If you want capacity — If you want a chute that will handle large aggregate concrete — If you want a chute that will handle dry concrete easily — You want Lakewood Half-Round, Arch-Band Chute.

*Bulletin 23-R gives the complete details—write for copy*

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**EQUIPMENT for CONTRACTORS**  
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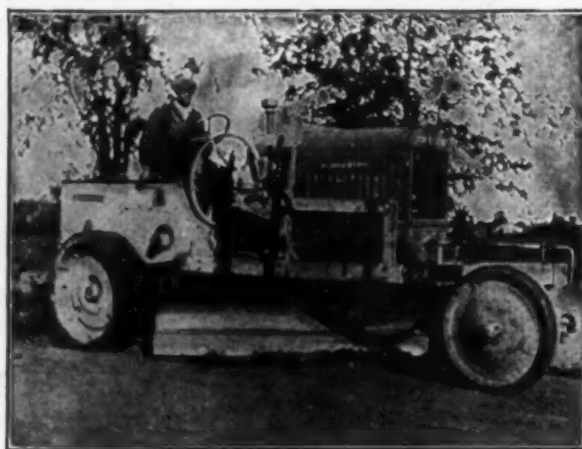
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Handle Heavy Loads.  
Cut to a true level.  
Go where you steer them.  
*It will pay you to investigate.*

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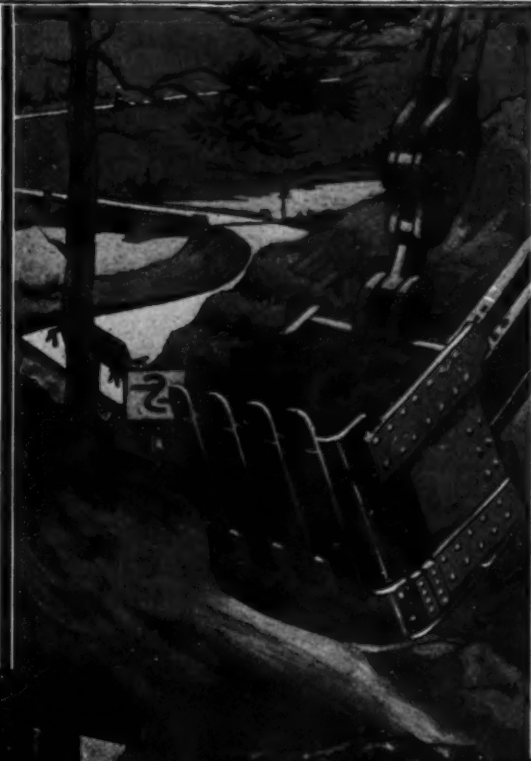
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LESS trailer equipment is needed where the Linn Tractor is on the job. Like a heavy truck—it carries pay load directly in its body. Combines the pulling power of the tractor with the load-carrying features, ease of operation and safety of the truck.

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Write for performance pictures, low cost records and complete facts about the Linn.



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## For quickly draining water—

in roadbeds, cellars, golf courses, air ports, athletic fields, etc., *Rapid Drain Pipe* has no superior!

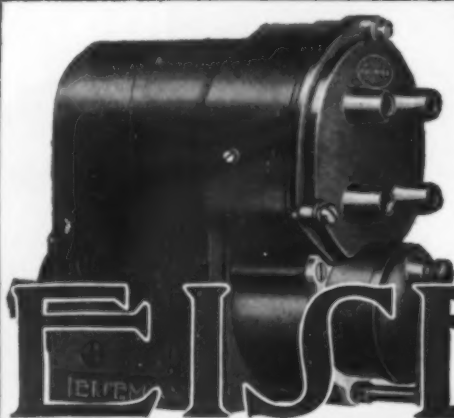
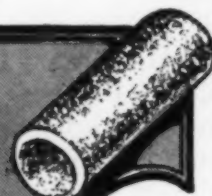
The illustration shows how water from springs in the surrounding hills which seeped into the new roadbed during the construction of the extension of Park Ave., in Park Ridge, N. J. was quickly drained. Roscoe P. McClave, Bergen County Engineer and Geo. C. Bennett, Contractor were much pleased with its performance.

Low in price—yet having unlimited life—*Rapid Drain Pipe* is being used by engineers and contractors everywhere. Where shall we send copy of our illustrated booklet explaining why?



## Rapid Drain Pipe

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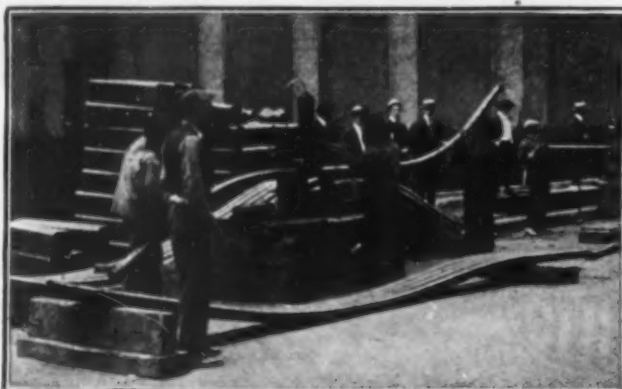
## The Preferred Magneto ~for Construction Equipment~



The overwhelming choice of the builders of high quality equipment. Favored by contractors everywhere.

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Watson-Stillman Hydraulic Benders Bending Conduit Pipe for Subway Work. Note that but three men are needed in the crew.

IF YOU HAVE MUCH PIPE BENDING TO DO  
You will find a

## Watson-Stillman Hydraulic Pipe Bender

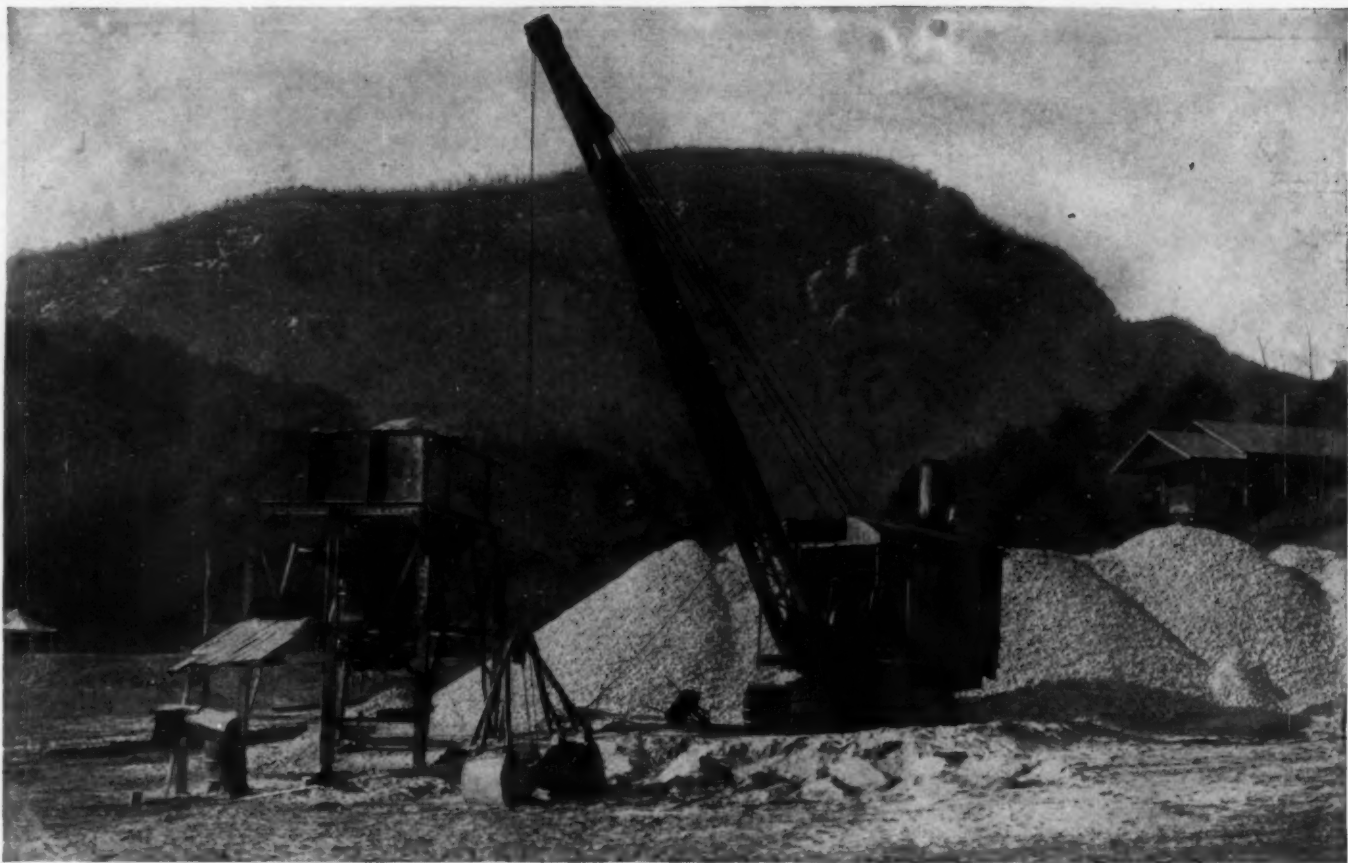
*A Time and Labor Saver*

We build pipe benders in a variety of types and sizes as well as a full line of Hydraulic Machinery, including jacks, pumps, accumulators, presses, shears, etc.

*Write for catalogs*

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Philadelphia, Widener Bldg. Detroit, 7752 Dubois St.



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*There is a Butler bin and a Butler hopper to meet the conditions of every construction job. In every type of "set-up" contractors are using Butler equipment to reduce material handling costs and to speed up work.*

Materials are handled with saving of time and money, in large and small quantities, over long and short periods, and in connection with all types of loading equipment and vehicles.

Tell us about your material handling problems. We will offer some practical suggestions that may be of use to you.

*[ Write for literature describing Butler bins and hoppers and showing how they are used to meet common and uncommon roadbuilding conditions. ]*







A Practical working book for the man who must get things done right and done quickly in modern construction work.

A manual of actual construction methods; methods that are used every day by practical construction superintendents and others upon whom rests the responsibility of getting things done. From first steps in organizing and preparing equipment, to pipework and painting; from pile driving to scaffolding, this new book covers everything in satisfying detail.

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A real chapter on rigging and erection work, Tables of safe capacities for tackle—a new, simple formula for strengths of manila and wire rope—figuring the strength of hooks and shackles—how to rig a gin-pole and shears, etc., etc., etc.

## STANDARD CONSTRUCTION METHODS

By G. Underwood  
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Everything in this book is practical, workable, and has been demonstrated over and over again in the field. It is a book no construction man will want to be without.

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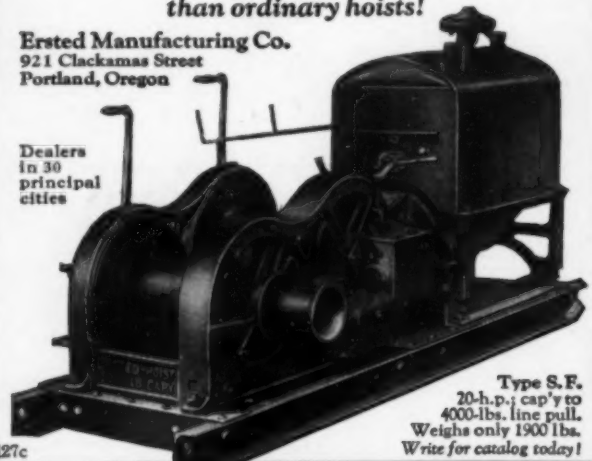
(Books sent on approval to retail purchasers in the U. S. and Canada only.) S.C.M. 2-1-28

# ERSTED All Steel *Automotive* 3 HOISTS SPEED

—worth more  
—cost less  
than ordinary hoists!

Ersted Manufacturing Co.  
921 Clackamas Street  
Portland, Oregon

Dealers  
in 30  
principal  
cities



Type S.F.  
20-h.p.; cap'y to  
4000-lbs. line pull.  
Weights only 1900 lbs.  
Write for catalog today!

# IRON MULE

The Original 2 Yard Tractor Dump



NEW FORD TRUCK and  
HUGHES-KEENAN  
DUMP BODY

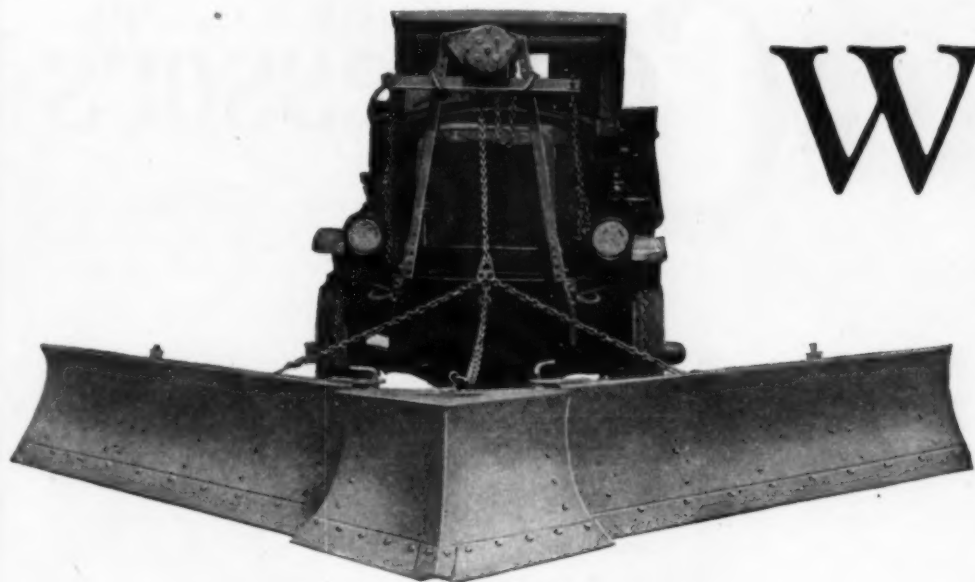
If you saw this new material handling unit at the Road Show at Cleveland, you know what new rugged durability, smooth, fast operation and over-all economy to expect from it. It sets a new pace for light dump trucks. Be sure to see your Ford dealer about it.

Standard 1 1/2 and 2 yd. steel dump bodies and full line of special purpose bodies. Also makers of the Iron Mule—2 yard tractor dump, and the Roustabout for industrial use.

The Hughes-Keenan Co., Mansfield, Ohio

## HUGHES-KEENAN

Steel Dump Bodies



# WHY

◆

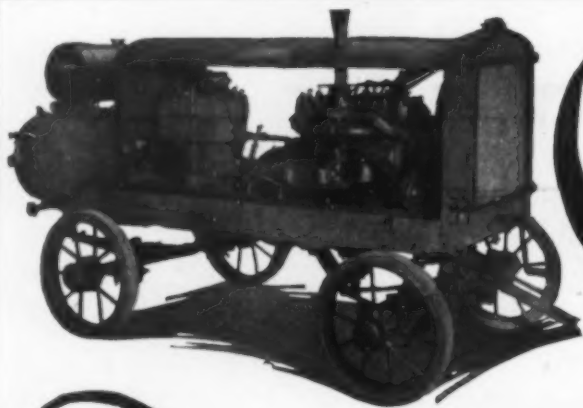
**“Made in our own  
factories” !!!**

**T**HAT alone is reason enough to have the utmost reliance in the established reputation of “Champion” Plows. Since we made the first motor truck plow in 1913, the ever-increasing demand has been sufficient thanks for our efforts in establishing the **Champion Snow Plows** as the only medium for economic snow removal. Write today for our new catalog and let us show you how you can save money by using the “Champion” plow adapted to your truck and your need!



**THE GOOD ROADS MACHINERY CO., Inc.**  
**Kennett Square** **Penna.**





*For mounting on Ford  
and other trucks*

# Compressors

# Schramm

"Schramm" Multi-Cylinder Engine Driven

We are glad to say that the Schramm compressors in the field have, without exception given uninterrupted power under all conditions of structural and road service.

Some of the outstanding features:— Powerful "Buda" Engines coupled to large capacity Schramm Compressors. (Also made with electric motor drive.) Capacities from 60 to 240 cu. ft. Gasoline strainers to keep grit and dust out of the carburetor. Heavy duty clutch permits easy starting—cut in the compressor after the engine is "warmed up." Adapted to truck, trailer or skid mounting or for use with a tractor.

A card brings the Schramm Catalog. We are glad to advise you on any compressor problem. Write.

**Inc., Manufacturers**  
**West Chester, Penna.**  
*Offices and Representatives in Principal Cities*

## Buhl

AIR COMPRESSORS

Below is illustrated the BUHL Type C Portable Compressor—one of the many different types of this popular line. Moderate in original cost and low in upkeep.

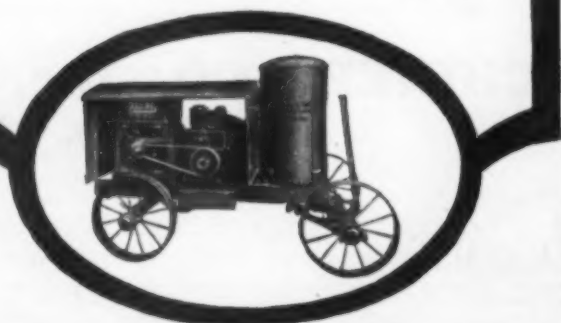
There are six sizes of portable air compressors in the BUHL line to choose from. For operating jack hammers, riveters, clay spades, concrete breakers, etc. The BUHL gives dependable air power at low cost—send for bulletins today.

*Sales offices in principal cities*

**THE BUHL COMPANY**

*Manufacturers*

**37 W. Van Buren St., CHICAGO**



### Moving 120,000 Cu. Yds. of Dirt From Hills to Ravine

The Spring Grove Cemetery of Cincinnati, Ohio, had two large hills to cut down and the ravine between the hills had to be filled. They cast aside their tractor-drawn wheel scrapers and plows for a 1 cu. yd. Sauerman "Crescent" Power Scraper because it could reach out a distance of 400 ft.—and because it could do the cut, fill work and grading in one operation on a one-man payroll.

This Sauerman Scraper moved 120,000 cu.yds. at the rate of 400 cu.yds. per day.

If you are interested in seeing what others are accomplishing with Sauerman Power Drag Scrapers, write us. We'll mail a complete booklet of actual working installations.

*No matter how large or small the job, there is a Sauerman Power Drag Scraper to do the work.*

**SAUERMAN BROS., INC.**  
480 S. Clinton St., Chicago





## Ialenti picked a winner for fast trenching on Staten Island

The picture shows a Bay City Tractor Shovel digging a trench  $4\frac{1}{2}$  feet deep for a 12-inch cast iron pipe water line along the Hylan Boulevard, Staten Island, New York. It is owned by Ialenti Bros., Staten Island.

The Bay City Trencher has dug as much as 600 feet in a nine-hour day on this job, and averaged 500 feet a day. This gives you some idea of its speed as a trencher. An 18-inch scoop was used. Its per-

formance attracted a great deal of local interest and attention.

The Tractor Shovel can be quickly converted to shovel, clamshell, dragline or backfiller. It weighs  $9\frac{1}{2}$  tons and has a traction speed of  $3\frac{1}{2}$  miles an hour. Lifts 3000 pounds at 18-foot radius. Three widths of ditches—18-inch, 24-inch and 30-inch. Digs ditch to 11 feet. Swings  $\frac{3}{4}$  circle. Goes where a big shovel can't go. One of the fastest operating convertible machines built.

A complete Eastern Service Station at Roselle, N. J.

*Every contractor can make more money by owning one.*

*Write for complete specifications and price.*

**Bay City Dredge Works**

New York Office  
302 Broadway

Bay City, Mich.



No. 85-C

# BAY-CITY

**TRACTOR SHOVELS**

**TRENCHERS**

**SKIMMERS**



## The List Grows

As time goes on more and more cities and towns adopt the Cleveland C6 for pavement breaking. Another\* has just been added to the list.

After exhaustive competitive tests by this Western Municipality the C6 proved to do a better job in less time, was the most economical to operate, was easiest on the men—they liked it best, did more work.

Almost without exception the Cleveland C6 saves 75% of the time and 50% of the cost on practically any job; as compared with hand methods.

*Ask for a demonstration.*

\*Name on request.

**The Cleveland Rock Drill Co.**  
3738 E. 78th St.  
CLEVELAND, OHIO

## ANOTHER LETTER TO CONTRACTORS

U. R. A. Contractor,  
Everywhere.

Dear Sir,—

"JUST LIKE ROWING A BOAT." That's the way you handle a Reversible Ratchet Wrench.

And speaking of rowing a boat, how fast would you get along if, after every stroke of the oars, you had to fit the oars to the oarlocks?

Yet isn't that what you do,—or something like it,—when you use the ordinary wrench on a bolt or nut?

"JUST LIKE ROWING A BOAT." Simple isn't it? Yes, if it's a Ratchet Wrench.

You may be erecting the steel towers for a power transmission line, assembling penstocks on a water project, engaged in a job where you are using a lot of lag screws or bolts,—no matter what it is.

If you are using wrenches and doing a lot of work with them, you'll save time by using **LOWELL REVERSIBLE RATCHET WRENCH.**

**AND TIME IS MONEY.**

Your operations may be best served with the Lag Screw pattern or perhaps you will need a heavier



wrench in the same style like the Steel Socket Bridge pattern.



"JUST LIKE ROWING A BOAT." A pull, the quick return, and then another pull.

Twice as fast as the ordinary wrench, in no time you'll write off in savings the price of the Ratchet Wrench.

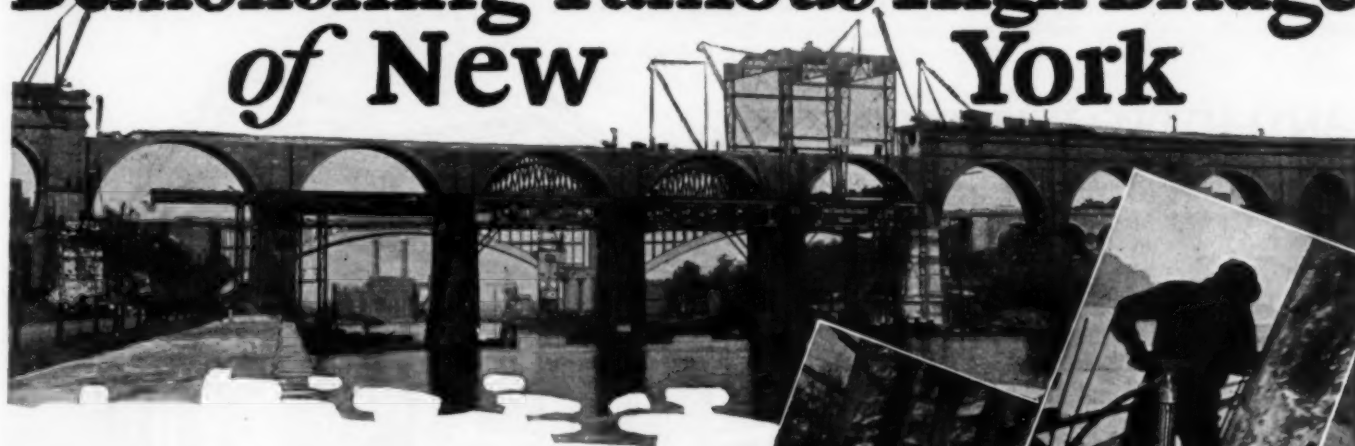
Very truly yours,

**LOWELL WRENCH COMPANY**  
54 Commercial Street  
WORCESTER, MASS., U. S. A.  
CATALOG M TELLS THE STORY



# Thor Paving Breakers

## Demolishing Famous High Bridge of New York



### THOR Paving Breakers Were Chosen for the Demolishing of High Bridge for their Speed—Power and lack of Vibration

The demolishing of High Bridge was a particularly knotty job, because it presented so many difficulties, not encountered in everyday breaking of concrete. Built 80 years ago as a supporting structure for a water main across the Harlem River, the stone bridge was a masterpiece. It was so well built that every stone removed represented an engineering problem.

The workmen were forced to stand on small ledges, where footing was insecure. In these tight places, everything depended upon the breaker used. Power and dependability were essential characteristics. A slip due to vibration would cause disaster.

No matter how tough the job may be, THOR BREAKERS will not only cut concrete BUT CUT COSTS AS WELL. They are the product of an engineering staff who are specialists in air tool construction. If you are experiencing rising costs or unsatisfactory results, THOR PAVING BREAKERS are the logical selection. Give them a test.

(Above)  
Working in tons of solid granite and concrete where Thor's power won.

(Above)  
Out on a high edge where a slip from vibration would be disastrous.

(Below)  
Some job to cut through this stuff. Yes, but "some" breaker, too.

(Below)  
THOR pals working in harmony high up where dependability means everything.



DON'T FORGET THE THOR ROAD BREAKER, THE FASTEST ON THE MARKET

## INDEPENDENT PNEUMATIC TOOL CO.

PNEUMATIC TOOLS      GENERAL OFFICES      ELECTRIC TOOLS  
600 W. Jackson Blvd. CHICAGO

FACTORY AURORA, ILL.

Eastern Office 1463 Broadway, New York



BRANCHES THE WORLD OVER

London Office 40 Broadway, Westminster, London



## Neither Weather Nor Water Could Hold Up This Job

"ANTI-HYDRO" was used throughout the concrete foundations, cement floors, concrete pits and interior vault walls in this bank building. Much of the concrete was poured during freezing weather with the aid of "ANTI-HYDRO," which makes concreting possible even at 15 degrees F.

Other difficulties were encountered and overcome on this job by using "ANTI-HYDRO." A water condition due to springs and surface water percolating through rotten rock. Quicksand was discovered under the section to be occupied by the vault. A fur storage vault in the basement had to be absolutely dampproof and waterproof.

"ANTI-HYDRO" so thoroughly and permanently hardened and waterproofed the concrete that the basement, vaults and floors in this building are permanently watertight and all work was completed on schedule time.

Use "ANTI-HYDRO" on your next job for speed, economy and guaranteed results.

### ANTI-HYDRO WATERPROOFING G.

265-269 Badger Ave., Newark, N. J.



FIRST NATIONAL BANK BLDG.  
PORTCHESTER, NEW YORK



UFFINGER, FOSTER & BOOKWALTER...ARCHITECTS  
MARCELLO MEZZULLO.....CONTRACTOR



### Perfect Heads

Perfect heads . . . . after the hardest driving these contractors had ever seen. Such is the report on this job.

Only Union Hammers have the exclusive Union Patent Base that insures perfect, undamaged concrete pile heads—even under such stubborn driving as this.

Built in 9 sizes—195 to 28,000 lbs.

Union Patent Cushion Base for concrete piles.

UNION-PILE-HAMMERS  
DRIVE  
AND  
PULL

UNION IRON WORKS  
Lackawanna Siding,  
Hoboken, N. J.

## A New Book of Pumping Experiences to Help You Check Up on Costs

Here's the new  
*Novo Pumping Handbook*

—just off the press. It is packed with pumping experiences of every kind in every corner of the country. And it contains valuable facts and figures that will help you check up on your pumping costs. Send for your free copy today.

NOVO ENGINE COMPANY, 214 Porter Street, LANSING, MICHIGAN

**NOVO**  
THE NEW  
NOVO  
ROLLER  
ENGINES  
Clarence E. Bement Vice-Pres. & Gen. Mgr.

**ACCEPT NO SUBSTITUTE**



More capacity loads per man  
each day means more  
real profit.

**Sterling**

"self-lubricating" axle bearing —  
guaranteed for the life of the  
barrow — means longer service  
and easier wheeling.

No oil service ever needed — permanent lubrication supplied. Rolls as smoothly when it's old as when it's new. You'll get *more work* out of a Sterling and they will *cost you less* per job. If you have used Sterlings *you know this* — if you have never used them try them on your next job — *it'll pay you*.

Leading Hardware and Equipment dealers have them — or they can get them quickly from our complete stock warehouses at Chicago, New York, Philadelphia, Pittsburgh, Cleveland, Detroit, St. Louis. **Write for catalog.**

**STERLING WHEELBARROW COMPANY**

STERLING ON A WHEELBARROW MEANS MORE THAN STERLING ON SILVER

Milwaukee

Wisconsin

compare with  
mixers costing  
\$250 more

**The BOSS**  
**ONE-TWO BAGGER**  
**MIXER**

1 bag at 1-3-6  
2 bags at 1-2-5  
built of steel

### Oversize Steel Drum

Compare the size of this drum—50 inches—with any mixer within \$250 of it in price.

The all-steel mixing drum is electrically welded and leak proof. The mixing action is the same high speed, patented, remixing, self cleaning action which has made the performance of BOSS MIXERS famous throughout the world. Big drum means better mixing and extra capacity when you want to push work hard. Steel drum means 800 pounds less dead load for engine to pull.

### No Breakdowns

This machine offers you everything that you have desired in a mixer. Built of steel to overcome breakdowns and to save weight—steel castings and forgings where strain is great. Hyatt Roller Bearings save 17% power and 60% oil—last for life of mixer. Massive gears of semi-steel type mean

fewer replacements. Chilled car wheel rollers. V friction hoist drum operates the power loader. Alemite lubrication. Electric welding replaces bolts and rivets wherever it is possible.

**25 to 30**  
**More Batches**  
**Daily**



**CLIP AND**  
**MAIL THIS**  
**COUPON**  
**NOW**

### Rapid Discharge and Remixing Action

The new BOSS Cross Discharge locks in both positions and operates at the touch of a finger. The loading skip empties without pounding into the sub-hopper. These two features have speeded up charging and discharging. The BOSS Patented Remixing Drum permits faster mixing and produces stronger, more uniform aggregate, 16 cu. ft. of concrete mixed per batch. Discharge averages 8 to 12 seconds. All features result in better work—quicker work—greater profits.

### Powerful 10-12 H. P. Gasoline Engine

Only best multi-cylinder gasoline engines on the market, including LeRoi and Novo, are used on BOSS Equipment.

### INVESTIGATE

Before you get any you owe it to yourself to investigate further the features of superiority of BOSS Mixers. Act Now! The coupon makes it easy for you to get complete information and prices.

**AMERICAN CEMENT MACHINE COMPANY, Inc.**  
238 S. Fourth St.,  
KEOKUK, IOWA

Please send me complete details and prices on the BOSS One-Two Bagger

Name .....

Address .....

City ..... State .....





## This Test Tells Your Compressor's Future

Dependable air supply has a lot to do with your profits—but you can't X-Ray your portable compressor to find out how good it is.

That is why the water test was created. This test is easy to make, but it reveals clearly the amount of vibration in your portable—the biggest factor causing wear and trouble.

Just fill an ordinary glass to the brim with water, and place it on the compressor frame. Do not block the wheels or brace the machine in any way.

Then start up and run full speed; let the machine load and unload, and watch the glass. *Under this test, the smooth running Sullivan Vibrationless Compressor causes scarcely a ripple on the surface of the water.*

Vibrationless operation with its many advantages, is something you are now entitled to in portables. Catalog 7283-F will tell you about "Vibrationless" Compressors.

**Sullivan Machinery Company**  
168 S. Michigan Avenue, Chicago

# SULLIVAN

Send me Free Catalog 7283-F describing Vibrationless Compressors.

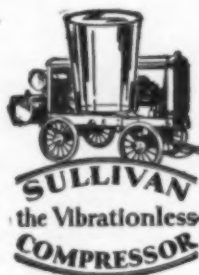
Name.....

Street.....

City..... State.....

Occupation.....

Sullivan Machinery Company  
168 S. Michigan Ave., Chicago



*Send this  
Coupon*



## Get the RIGHT Tarpaulin

for your job. The four grades of "Erico" Kantluze Tarpaulins are the result of years of experience. The Kantluze feature positively identifies your Tarpaulins. The material is stronger. The sewing is better. The water-proofing stays in. Priced at 6, 7, 8 and 9 cents per square foot. Immediate shipment in any size desired. Samples on request.

### We Manufacture

Wind Breakers — Tents — Tarpaulins — Roof  
and Deck Cloth — Cotton Duck and  
Membrane Waterproofing Fabric

**FRED EHRLICK CO.**

194 24th Street  
BROOKLYN, N. Y.

## To make your unwatering and water supply problems easier!



**THIS** Morris Portable All-Purpose Pump handles anything from clear water to floating dirt, sand and gravel, delivers 300 to 600 gals. per min., can be used for heads up to 50 ft., and is easy to cart from one job to another. For general water supply, unwatering excavations, sumps, etc., it can't be beat.

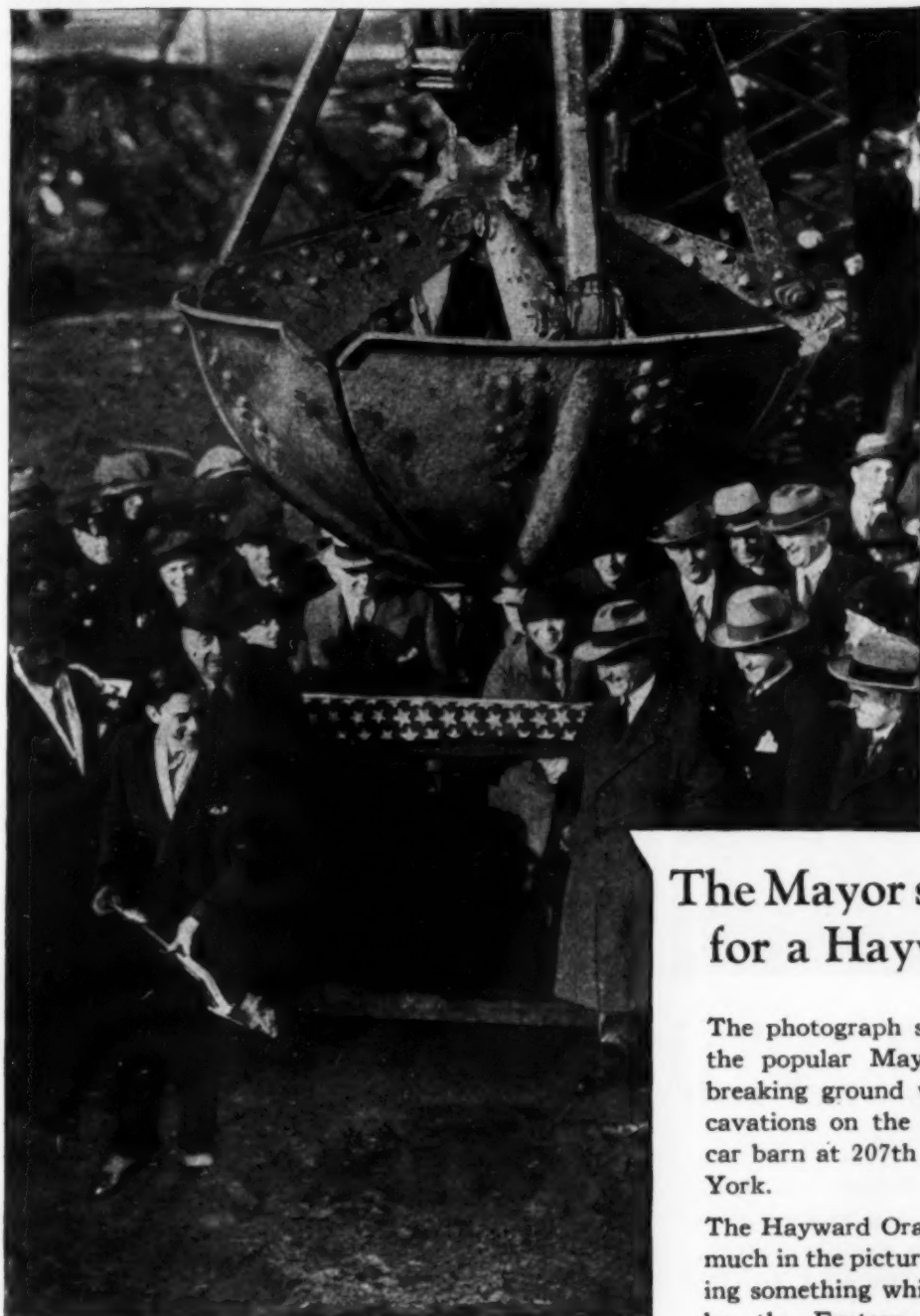
*Write for literature about this and other sizes  
of Morris Pumps*

**MORRIS MACHINE WORKS, Baldwinsville, N.Y.**

# MORRIS

  
CENTRIFUGAL PUMPS





# Hayward Buckets



**Hayward Standard  
Orange Peel Bucket**

*A power wheel bucket of the two line type, one line being used for closing and digging, the other for holding the bucket while it is opening and discharging.*

## The Mayor starts something for a Hayward to finish

The photograph shows "Jimmy" Walker, the popular Mayor of New York City, breaking ground with a spade for the excavations on the new \$4,000,000 subway car barn at 207th St. and 10th Ave., New York.

The Hayward Orange Peel Bucket is very much in the picture, for the Mayor is starting something which the bucket, operated by the Eastern Construction Co., will finish.

Hayward Orange Peel Buckets are very much in the picture in *any* tough digging assignment. In hard-packed soil — in outdoor winter excavation, or in muck, mire and underwater work, this type of all-round contractor's bucket is equally at home.

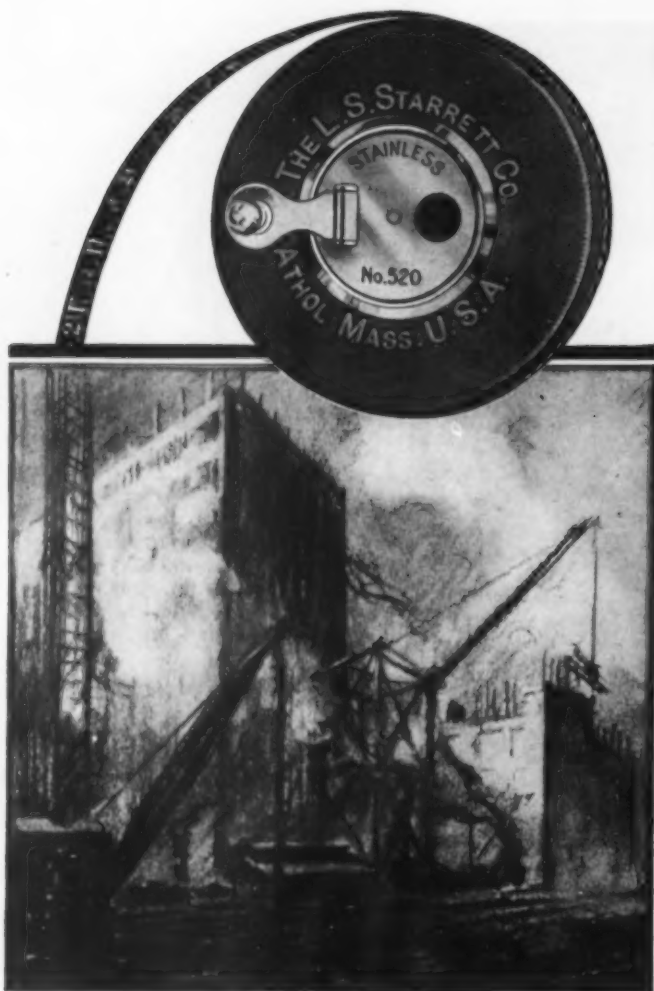
**THE HAYWARD CO.**

44 Dey Street, New York, N. Y.

Builders of Clam Shell,  
Orange Peel, Drag Line  
and Electric Motor  
Buckets; Dredging, Ex-



cavating, and Coal Han-  
dling Machinery; Auto-  
matic Take-Up Reels;  
Counterweight Drums.



## For muddy work—a Starrett Stainless Steel Tape

On muddy foundation jobs, in rainy weather or around salt water—in fact anywhere that conditions play havoc with an ordinary tape a Starrett Stainless Steel Tape is worth its weight in gold, for it cannot rust.

The No. 521 Starrett Stainless Steel Tape is graduated in feet, tenths and hundredths; the No. 520 is graduated in feet, inches and eighths of an inch. They are both made in 50 and 100 foot lengths with the handy Starrett Quick Reading Graduations, Push Button and genuine leather case.

See these tapes at your dealers. Write for full information and copy of the new Starrett Catalog No. 24 "NF."

**THE L. S. STARRETT CO.**

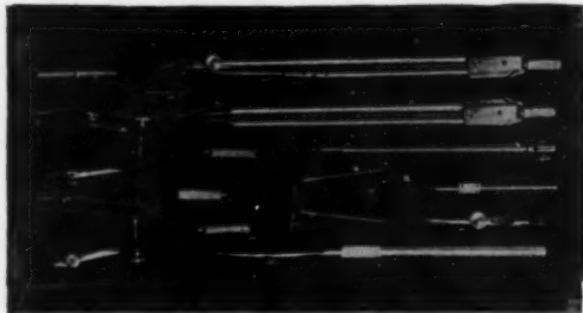
*World's Greatest Toolmakers  
Manufacturers of Hacksaws Unexcelled  
Steel Tapes—Standard for Accuracy  
ATHOL, MASS., U. S. A.*

# Use Starrett Tools

1532

## While they Last!

A limited number of  
**JANSSON**  
Drawing Sets



Finely made of German Silver and Tool Steel—11 pieces—Case, folding flap style, black Fabri-koid lined with green velvet.

*Backed by Kolesch  
"Money Back  
Guarantee"*

**\$3.65**  
Postpaid



**KOLESCH & COMPANY**

138 Fulton St., New York, N. Y.  
Established 1885



## Architects Convertible Wye Level with Compass

A remarkably fine instrument for Roadbuilding, Architects, Surveyors, Engineers who need a general purpose instrument of precision and sturdiness. True to the standards of Beckmann quality, it represents an unusual value at moderate cost. We will be pleased to send complete details and prices.



**The L. Beckmann Co.**

*Established 1874*

428 Jackson St., Toledo, Ohio

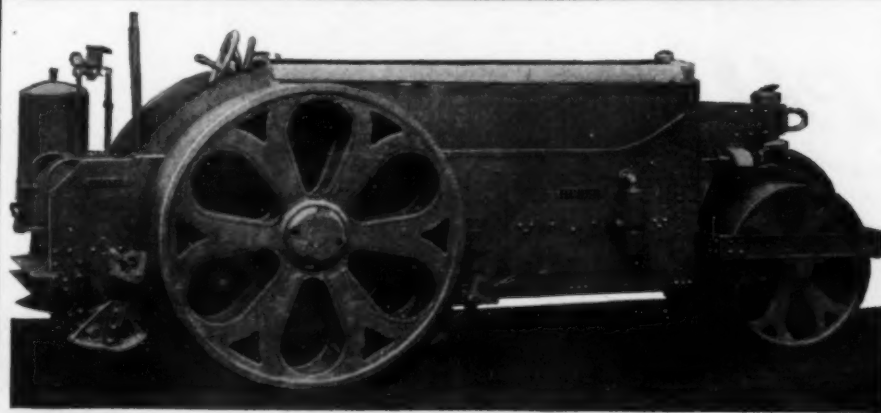
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Non-clogging, everlasting rubber ball valves, totally enclosed, running-in-oil jacks, bronze bushed bearings, all steel trucks, and enclosed engine crank cases make **HUMDINGER PUMPS**.

*Full detail description given in Bulletin No. 1034 CM. Send for a copy.*

**RALPH B. CARTER CO., 126 Chambers St., New York**

**Factory:** Hackensack, N. J.



4 CYLINDER  
MOTOR ROLLERS

**Powerful and dependable, quick in action, economical to operate. Made in 4 sizes (5-7-10-12 Tons). Send for Huber Motor Roller Catalog.**

**THE HUBER MFG. CO.**  
315 Center St., Marion, Ohio



# "Plan every detail most carefully before you let the contract"

...says this prominent  
bridge engineer

"IN 1925 and 1926," said C. E. Andrew, formerly Bridge Engineer of the Washington State Highway Department, "we completed the most extensive highway bridge projects in our history. Our expenditure was practically doubled over that of any other biennium.

"The State Highway Department has constantly endeavored to construct the very highest type of modern bridges, consistent with an economic expenditure of public funds," Mr. Andrew continued.

"Take the Puyallup River Bridge, for example, which carries the Pacific Highway over the Puyallup River. It's the largest single bridge we have ever constructed. It eliminates four major railroad crossings and it will eventually cross about forty railroad tracks. Yet, in spite of the many angular complications encountered in form work, the final cost, including engineering, was but \$244 per lineal foot of bridge.

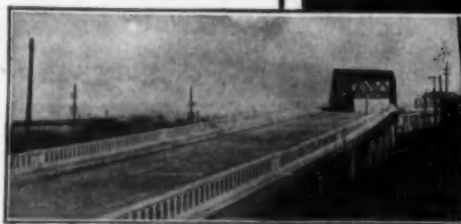
"In all our concrete structural work, we have planned every detail so carefully that little is left to judgment after the contract is let. We have found that minute attention to preliminary designs and investigations is the means of saving many dollars of public funds."

\* \* \*

Carey Elastite Expansion Joint has played a major part in the construction of Washington's imposing concrete bridges. In the maintenance, too,



C. E. Andrew, formerly Bridge Engineer of the Washington State Highway Department, with headquarters at Olympia, Washington. Mr. Andrews is widely respected for his first-hand knowledge of concrete construction problems.



Puyallup River Bridge, Tacoma, Washington. 2833 feet long; 36-foot roadway between curbs; two 5-foot sidewalks. Protected indefinitely against expansion forces by Carey Elastite Expansion Joint. J. F. Hamilton, resident engineer.

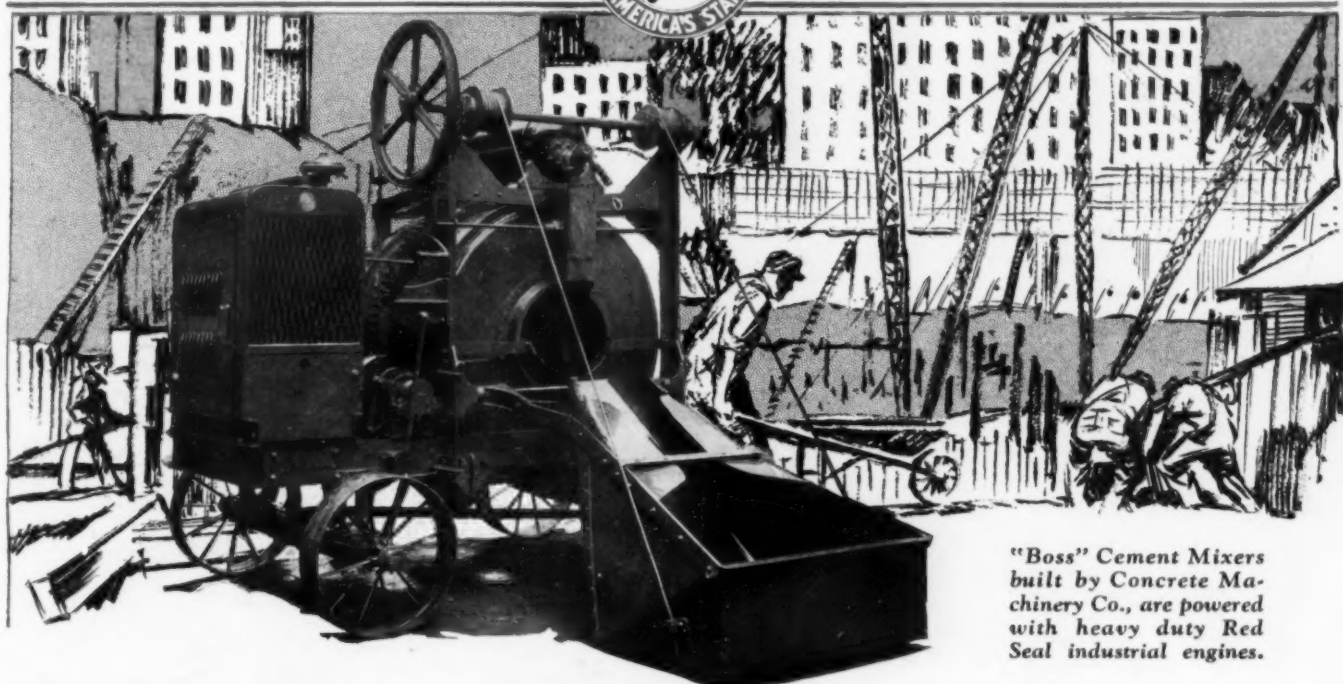
for transverse joints, placed at frequent intervals through the roadway and sidewalks, absorb expansion and contraction stresses and add immeasurably to the life and appearance of the concrete. We'll be glad to tell you more about Carey Elastite Expansion Joint—how well it is helping to safeguard the professional reputation of leading construction engineers from coast to coast. Write today for your copy of our free manual.

## THE PHILIP CAREY COMPANY

Lockland, Cincinnati, Ohio

**Carey Elastite**  
TRADE MARK REGD. U.S. PATENT OFFICE  
**EXPANSION JOINT**

Dependable Power  for Every Purpose



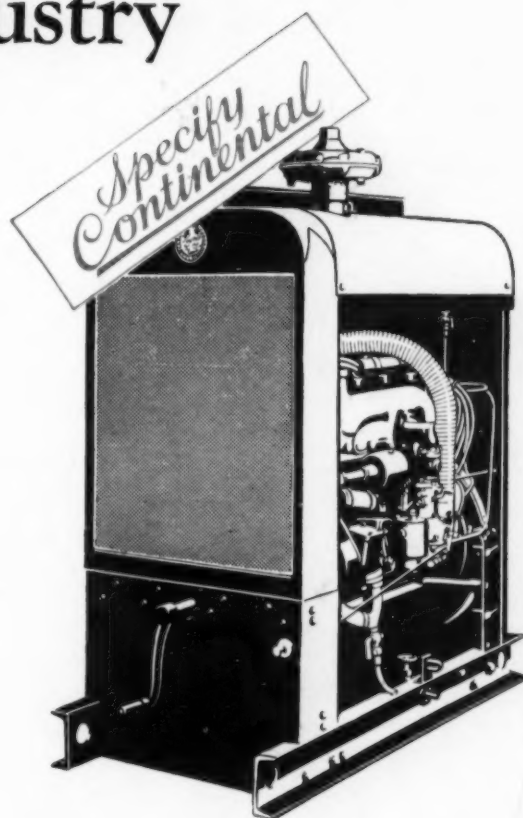
"Boss" Cement Mixers  
built by Concrete Ma-  
chinery Co., are powered  
with heavy duty Red  
Seal industrial engines.

## The Heart of Industry

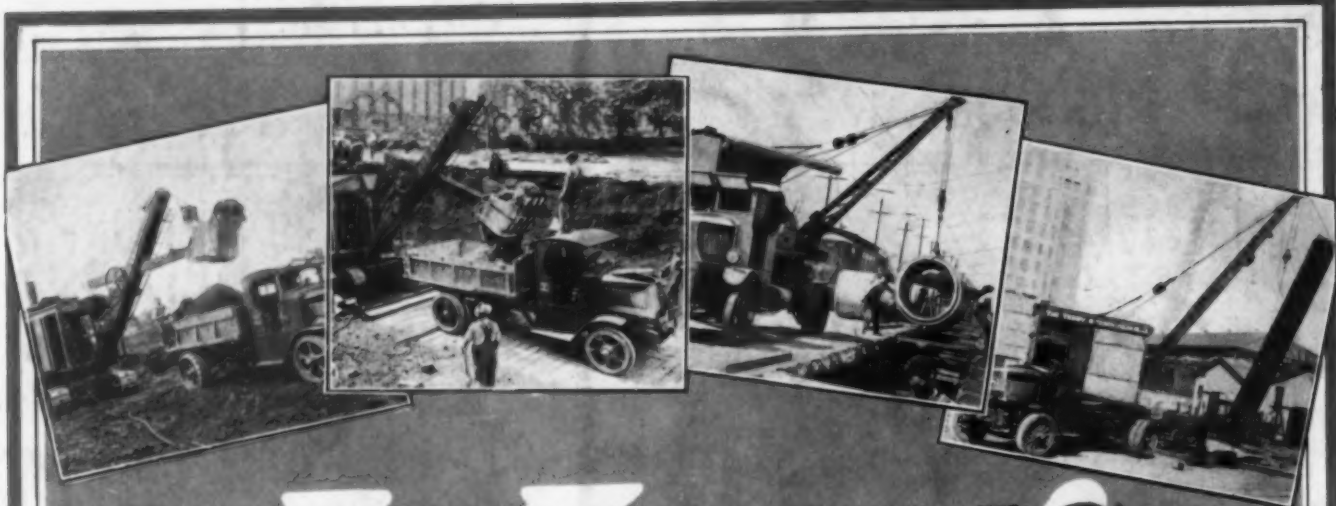
Experienced over the years in interpreting the power needs of an industry, Continental is able to strike right at the heart of industrial necessity by developing special models of industrial engines capable of greater power, more flexibility, better economy and longer life.

There is a complete line of heavy duty Red Seal Continental engines for every industrial need. Specify Continental and enjoy these qualities together with the protection which has contributed to Red Seal leadership in industrial power.

CONTINENTAL MOTORS CORPORATION  
INDUSTRIAL EQUIPMENT DIVISION  
Office and Factory: Muskegon, Michigan  
*The Largest Exclusive Motor Manufacturer in the World*



# ***Continental Motors***



# UNYIELDING POWERFUL DEPENDABLE

**U**NYIELDING — powerful — dependable—are the qualities bound up in the heart of a bulldog.

It must have been that those men who handled the first Macks strongly sensed the bulldog char-

acteristics or they would not have voluntarily christened Macks the "Bulldogs" of the highway.

It was not until the name became generally popular that it was officially adopted by the Mack Company.

**MACK TRUCKS, INC.**  
INTERNATIONAL MOTOR COMPANY  
25 Broadway New York City

One hundred and four direct MACK factory branches operate under the titles of: "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION", "MACK MOTOR TRUCK COMPANY", or "MACK TRUCKS OF CANADA, LTD."



## YOU NEVER SAW A BULLDOG QUIT